

Learning Networks for Professional Development

2009 - 2014

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CELSTEC - Centre for Learning Sciences and Technologies

Learning Networks Programme

Learning Networks for professional Development

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Table of Contents

Introduction.....	7
Management Summary	9
Part I Management Report.....	11
1. CELSTEC's mission	12
2. The Programme's mission and objectives	13
3. Research, development, valorisation, and education and training	15
Three themes.....	15
Activities.....	17
4. Contributions to policies of external bodies	18
5. Collaboration within the Programme, management of its themes	21
6. Collaboration within CELSTEC, with other programmes, and within the OUNL ..	24
7. Quality control	26
SEP.....	26
Research Schools.....	28
8. Guaranteeing relevance over time.....	29
9. Communication.....	31
10. Research & development as well as valorisation portfolios	33
Research and development portfolios	33
The valorisation portfolio	33
11. Capacity management and non-human resources	35
Non-human resources	37
12. Output targets and reputation management	38
Research output	38
Development output.....	38
Valorisation output.....	39
Reputation management.....	39
13. A convivial workplace and opportunities for professional development of staff..	42
14. Instrumentation.....	44
Part II Academic Elaboration	45
1. Context and ambitions	46
2. Theoretical underpinnings	48
3. Programme themes	51
Professional Development	51
Learning Network Support Services.....	53
Professional Communities	55
4. Research methodology and key technologies	58
Design research.....	58
Technologies	58
References	60

Introduction

The present document contains the description for the Learning Networks Programme. It is meant to cover the period from 2009 until 2014 and, apart from the management summary, consists of two parts. Discussing them in reversed order, part II contains an argued description of what topics the Programme seeks to address, what problems it wants to resolve, what contributions to theory development it wants to make. The description sets the plan both in the context of work carried out in the previous Learning Networks Programme and in the contexts of activities that have been and are carried out elsewhere. Conversely, part I contains information on the organisational measures and policies that need to be put in place in order for the Programme to function at all.

Prof. Dr. Peter B. Sloep

Heerlen, June 5th, 2009

Management Summary

The Learning Networks Programme grew out of an earlier programme on Learning Networks, which ran from 2003 to 2008. Although in the essence of the topics studied and the methodology adopted there are no differences, significant changes of emphasis have been made.

Most importantly, the Programme has not just a development objective, but as part of its mission seeks to contribute theories and models that are specific to its field and engage in validation activities of the theories, models and software solutions it has developed. Second, a Learning Network now is also, and predominantly, analysed from the perspective of an online, *social* network. This lead to the analysis of competences and their development from a less mechanistic, gap-analysis type of approach to a more societal, situated perspective; as well as to a rich stock of network design rules and guidelines, that help improve a Learning Network to become more effective and efficient as a knowledge diffusion and knowledge inculcation device. Notwithstanding these new emphases, the devising and development of computer-based support services for competence development and network facilitation remain key to the Programme.

The management part to the Programme discusses how the Programme's ambitions fit in with the world around it, varying from CELSTEC to UNESCO. It details the ambitions and indicates what measures, procedural and organisational, will be taken to guarantee these ambitions will be met in time.

Part I Management Report

Part I is the management report for the Learning Networks Programme. It is only available to CELSTEC staff and contains descriptions both of what the Programme seeks to achieve and of how it attempts to do so.

1. CELSTEC's mission

CELSTEC, the Centre for Learning Sciences and Technology of the Open University of the Netherlands (OUNL), is a research centre, specialising in innovative methods and technologies for the advancement of adult learning in such contexts as at home, at work, at school, with mobile devices. CELSTEC aims to enhance the integration and amplification of learning at work and at home, to promote the employability of the workforce, to support the development of learners' competences and talents throughout their life history, to renew assessment methods, to respond to differences between individual learners, and to better the support they receive. This will be accomplished by utilising the innovative powers of new media and of information and communication technologies.

As a research centre, CELSTEC uses its expertise to perform three, mutually connected functions, all the while trying to be innovative:

- Creating new knowledge, services and technologies through scientific research and technology development.
- Experimenting with new knowledge, services and technologies to gather experience with their usage in pilots and test beds, in collaboration with knowledge and technology partners as well as the OUNL's departments and faculties.
- Sharing knowledge, services and technologies with others, through education, dissemination and valorisation activities; within the OUNL, this function is implemented through its participation in the IPO-programme, which carries out implementation projects with faculties; the Ruud de Moor Centre, which devotes its time and energy to supporting teacher education; the openER project, which makes course elements available free of charge; and similar.

In short, CELSTEC researches new methods and technologies, which can advance adult, post-initial learning in a variety of contexts; it shares the research results widely and helps organisations to implement these results in practicable ways.

2. The Programme's mission and objectives

The Programme predominantly focuses on the needs of professional learners, adults who have completed their initial education and in the course of their professional lives need to keep their skills and knowledge up-to-date or even expand or reorient them. This group engages in both formal learning activities and non-formal ones. However, it is an underlying assumption of the present Programme that non-formal learning activities suit their needs best (see part II for more on this). Here, professional learning will therefore be identified with non-formal learning.

This emphatically is not to say that the Programme will not pay attention to formal learning at all, or may hold valuable lessons for it, or, even more radically, advocates putting an end to all formal learning. However, it does try to put non-formal learning centre stage. In a way, it attempts to redress the balance as in the past much attention has been to formal learning and still most attention goes to it. After all, most teaching is carried out by formal educational institutions, in the context of relatively homogeneous cohorts who are educated in relatively homogeneous ways. Courses, for instance, are parts of curricula, which only change every so often. Progress through a curriculum is subject to complex rules and regulations, exams serve to monitor and sanction progress. Diplomas form the equally formal endpoint. This kind of education has served society well and still does, particularly in the context of initial education, but the Programme will not upfront have its research efforts be limited by making these kinds of assumptions¹.

Until quite recently, education was almost synonymous with the intersection of formal and initial education. Education stood for all educational activities directed to children, adolescents, and to a very small extent adults who for some reason or other had been unable to complete their initial education at a younger age (initial education). It was offered by dedicated institutions (schools), which set up curricula, offered diplomas, hired teachers etc. (formal education). The advent of the knowledge society with its insatiable need for ever more, ever more highly educated people has changed all this². Initial education still has its role to play, as we still need to educate young people. However, their education really never stops, they should learn throughout their professional life, uninterruptedly. Indeed, the term initial education then becomes a bit of a misnomer, as it suggests education ends at some point of time and then later on is picked up again as post-initial education. But really, what is needed is that 'initial education' smoothly and almost unnoticeably transforms into forms of education more appropriate for working people. People, working people, should not be lost to education to be lured back into it at a later stage; they should never have left in the first place. The concept of lifelong learning seeks to capture this idea. Of course, engaging in professional, lifelong learning and employing a non-formal approach to it is very demanding. It sets

¹ Terminology with respect to the categories of formal, non-formal and informal learning is not standard. In this plan, formal learning is learning in a curricular structure offered by one or a small number of dedicated educational institutions. Non-formal learning refers to learning activities that a learner consciously decides to undertake, without necessarily subscribing to a particular curriculum, aiming for a diploma, or enrolling in some specific institution. Informal learning is the learning we all do all the time, the kind of learning we cannot refrain from. See also Colley, H., Hodkinson P., et al. (2003). *Informality and formality in learning: a report for the Learning and Skills Research Centre*. London, Learning and Skills Research Centre

² Supporting evidence for this thesis abounds. A 2000 memorandum by the European Commission (Commission Staff Working Paper. *A Memorandum on Lifelong Learning*. Brussels, Belgium, European Commission) serves as a convenient starting point. See also Sloep, P. and Jochems W. (2007). *De e-lerende burger. Jaarboek ICT en samenleving 2007; Gewoon digitaal*. J. Steyaert and J. De Haan. Amsterdam, Boom: 171-187.

high standards to the way educational opportunities are offered, or rather how what is offered adapts to the experience, habits, and lifestyle, demands of the learners as these change over their lifetime. It also demands that educational institutions adapt their organisations so as to be able to offer these kinds of opportunities.

Rising to this challenge is, in short, what the Learning Networks Programme sees as its mission. Acquiring insights, and providing tools and guidelines for the educational establishment as well as newcomers to devise ways of teaching and learning that suit the needs of modern-day learners. For the traditional educational institutions - more so for higher education than for secondary education, more so for secondary education than for primary education - this also means considering to what extent these tools and guidelines may be useful to them. Key to the Programme is the notion of a *Learning Network*, an online environment which through its tooling and design embodies the insights acquired into what it takes to realise non-formal modes of teaching and learning.

At the completion of the Programme, six years from its inception, several insights into the operation of Learning Networks as a device to support professional learning through non-formal means will have been acquired. The insights will have been translated into clear-cut design guidelines and a variety of instruments for setting up and maintaining a Learning Network. These tools and guidelines will have been tested in a variety of Learning Network instances, learning environments in which the efficiency and effectiveness of the tools and guidelines have been evaluated with actual learners, actual providers of learning opportunities, and actual staff of these providers. Such evaluative tests will be conducted with regional, national and international partners, paid for by the Programme and its partners jointly, funded by regional, national, European and other international stake-holders.

3. Research, development, valorisation, and education and training

The description of the Learning Networks Programme is broken down along two orthogonal dimensions; first the academic field or domain the Programme addresses, second the various kinds of activities it seeks to carry out. The domain description serves to delineate what the Programme is about, in what academic field its ambitions are located. A more extended version, which also contains a justification for the choices made, is available as part II to this Programme Plan. The description of the activities details how the Programme seeks to realise its ambitions.

Three themes

The Programme specifically addresses the needs of professional learners. Its points of departure are the individual's employability concerns, translated into competence development needs³. Crucially, it is assumed that there are cohorts nor curricula and that educational service providers, public as well as private educational institutions, usually will be involved in helping the individual to fulfil his or her competence needs. Under these deliberately stringent assumptions, the Programme postulates that a Learning Network is the best possible environment for professional learners to fulfil their competence development needs. Laying down design guidelines for Learning Networks and developing artefacts with which to make it function properly, encompasses the prime ambition of the Programme.

The Programme attempts to realise this ambition by organising its activities under three themes. The first theme covers *Professional Development*. Professional development is understood always to take place via the development of a professional's competences. Competences serve as a kind of *lingua franca* to a Learning Network. Competences and their subsumption under higher order competences allow learners to gauge their progress and content providers to target their services. For learners, their starting position and learning objectives can be translated in terms of competences already acquired and competences sought. For content providers, their courses can be individuated through the competences (and levels thereof) they address. The Professional Development theme addresses the question of how competences and their related services can best serve the emergence and proper functioning of Learning Networks.

³ For arguments that support this approach, see Cheetham, G. and Chivers G. (2005). *Professions, competence and informal learning*. Northampton, Edward Elgar Publishing.

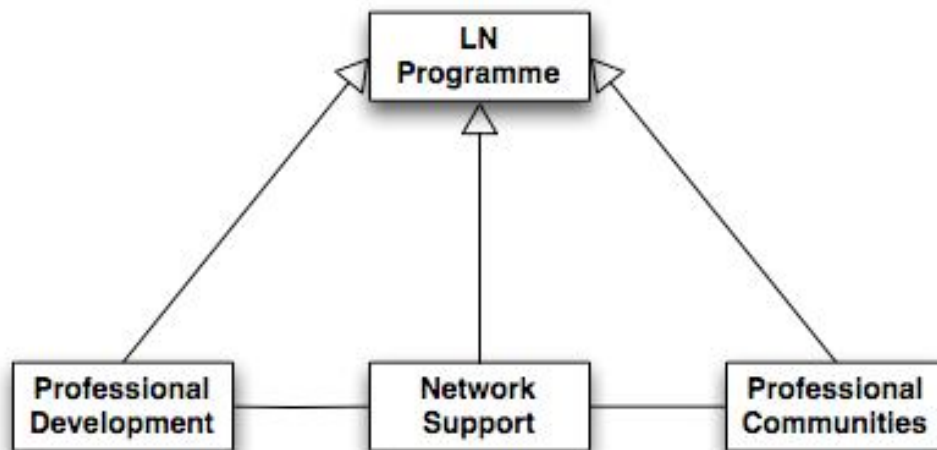


Figure 1. The programme and its constituent themes. Themes jointly constitute the programme, the network support theme contributes to both the professional development and professional communities' themes, which in turn inspire the network support theme.

Once competences acquired and targeted have been identified, engaging in learning activities needs to guarantee a progression from the former to the latter. A variety of *Learner Network Support Services* (theme 2) is needed to make this a viable option. The development and deployment of such services is the brief of the second programme theme. Learning Network support services come in a variety of kinds, but they all serve to ease the transactions that take place within the confines of the Network. Many of those services are targeted towards the professionals that inhabit the Network and seek its help to fulfil their competence development needs. Such needs may vary from having their prior competences assessed to advice on what learning opportunities best fit their particular situation and needs. Although a Learning Network's main inhabitants are learning professionals, others may be present as well, such as providers of learning opportunities or people who offer tutoring help to the learners. Focusing on the learners, services that are offered to them come in two kinds: services that build their recommendations on the collective behaviour of all Learning Network inhabitants, adequately collated and filtered; and services that provide help by connecting the help-seeking individual with carefully matched peers. The first kind of service is fast but anonymous, the second is slow but personal; the first leaves the learner isolated, the second connects learners with each other. Both have an important role to play in Learner Networks. Learning Networks are primarily networks of people. However, as they are online networks, they need suitable computer-based infrastructures to function properly. The design and, to the extent that this is appropriate, development of such infrastructures, also falls in this theme's purview. Therefore, the Learner Support theme addresses the related questions of what infrastructures and services are needed or desirable, and how best to design them to fit in the overall computer-supported ecosystem of the Learning Network.

Because it connects learners with each other, the second kind of peer-based learner support services paves the way for the third theme of *Professional Communities*. There is a variety of reasons of why building such communities is desirable in the context of a Learning Network. First, as teaching staff time is presumably scarce and costly, particularly in the context of a Learning Network, peer support is a way partly to fulfil the learners' needs to consult teaching staff. Second, there is evidence that learning profits from social contacts anyway. Third, as non-formal learners have both a learning life and a professional life, building learning communities primes the emergence of valuable communities of practice. Peer-based learner services result in highly topical, fleeting contacts between learners. It is this theme's working hypothesis that one may capitalise on

these contacts to seed the emergence of less topical and longer lasting contacts in increasingly larger groups of learners, which eventually acquire the characteristics of genuine communities. Through this mechanism, it is hoped, a Learning Network becomes a patchwork of relatively stable, overlapping communities. Moreover, such communities will exhibit the dual nature of a community of learning and a community of practice. This theme addresses the related questions of what are the benefits of the emergence of communities, what network structures then work best, and what mechanisms need to be designed to guarantee the emergence of such structures. The services theme also develops the tooling

Activities

The description of the themes rightly suggests a design-based research approach. First of all, a Learning Network is an artefact the characteristics of which are inferred from its intended function: serving non-formal learners. In that sense, it encompasses an empirical hypothesis for we do not know to what extent the particular design envisaged here serves that function. Similarly, the three themes postulate the artefacts of competences, learner support infrastructures & services, and communities as contributing to the overall functionality of the Learning Network. If one were further to breakdown the themes, other artefacts would appear for which similar arguments would hold. The Programme thus builds on a kind of research that marries various theory-based expectations of artefact functioning with empirical data on the discrepancy between actual and intended artefact functionality. This kind of research is both theory driven and practice motivated, whence its name design-based research. It uses theoretical insights to underpin its practical work, indeed in its quest for pertinent theoretical underpinnings it may contribute to concept and theory formation. If the notion of a Learning Network proves to be a viable one, it constitutes a valuable theoretical notion. If generalisations about it can be made, for instance about non-formal learning as a distinct from formal learning, its elaboration has contributed to theories of learning. It is practice motivated as, ultimately, it seeks to find solutions for practical problems. In the present context, a Learning Network ultimately is an instrument meant to solve the problems of teaching of and learning by non-formal learners.

So one may distinguish both *research activities*, meant to contribute to concept and theory formation, and *development activities*, meant to design, develop and evaluate artefacts. Valuable as research and development activities are, in the final analysis the artefacts produced need to prove their value in the real world, irrespective of requirement analyses that have been made, and outside off controlled testing contexts. *Valorisation activities* are the third kind of activity the Programme attempts. Valorisation is needed to lend further support to the credibility of an artefact as a functionally valid artefact. Valorisation activities are always conducted in close collaboration with prospective users. Furthermore, valorisation is also necessary to prove that money spent on research and development has been spent sensibly.

Please note that valorisation is not the final step in an artefact's life-cycle. An artefact that has proven its functional value still needs to be assessed for its implementation potential. This, however, falls outside the scope of the Programme as a host of considerations come into play that are not under the Programme's control. These are to a large extent context dependent and pertain to costs, characteristics of prospective users, implementation site policies and ambitions, etc. Obviously, parties involved in valorisation activities are the most likely ones to contemplate implementation. However, not to raise unwarranted expectations, valorisation and implementation in the context of some specific organisation should be rigourously kept apart.

4. Contributions to policies of external bodies

The Programme's ambition is motivated by a variety of drivers, some internal to the OUNL, some external to it. First of all, the present Programme is a continuation of a previous programme on Learning Networks⁴. Although different in several aspects, particularly in its insistence to view a Learning Network as an online *social* network, it shares its original ambition and mission statement. So whatever was adduced then and there in support of the plan, applies now and here. However, in the six years that have passed since, educational policies have changed at levels varying from the institutional (OUNL) to the national and European. This warrants a reconsideration of the Programme's fit with those policies.

The Education Council of the Netherlands (Onderwijsraad) is a council of education experts that carry out studies on topics they deem important as well as provide the Dutch government with advice on matters educational, whether invited to do so or on their own accord. In 2003, the council published a study entitled *Leren in een kennissamenleving* [Learning in a knowledge society] as well as a report entitled *Werk maken van een leven lang leren* [At work with lifelong learning]; both are significant in the present context⁵. The study sketches several recent societal trends, such as the substitution of competences for knowledge as the object of what needs to be learnt, and the changing nature of the economy, which to an ever larger extent relies on knowledge and competences. It then argues that these changes lead to new expectations with respect to the part education has to play in society, which, according to the council, should result in new learning arrangements (settings) and new learning paths (strings of learning arrangements)⁶. The learning arrangements should obviously be competence based so as to acknowledge the advent of a new kind of knowledge, and learning arrangements should honour formal learning as well as non-formal and informal learning. The study concludes that learning inside the traditional school and outside of it both have their place, but that we should strive to arrive at strategies for connecting both.

This theme is picked up in the council's advice on lifelong learning. It argues that we must see the term 'lifelong learning' in its literal sense, as education from cradle to grave, encompassing pre-school, school (initial education), and after school (post-initial education). It notes that the boundaries between the initial and post-initial phases become blurred, with students doing ever more placements in the professional world and professionals going back to school more frequently. Having established the importance of post-initial learning and having discussed means to pay for it, the council notes that there is a need somehow to certify this kind of learning in ways that are independent of the particular learning path followed (and therefore independent of the particular learning arrangements that it consists of).

The position taken by the council in both reports is not particularly new or even visionary. It is echoed in reports by a variety of other institutions. Thus a UNESCO committee headed by Jacques Delors notes⁷:

4 Koper, E. J. R., & Sloep, P. B. (2002). Learning Networks connecting people, organizations, autonomous agents and learning resources to establish the emergence of effective lifelong learning. RTD Programme into Learning Technologies 2003-2008. More is different..... Heerlen: Open Universiteit Nederland.

5 Onderwijsraad. (2003). *Leren in een kennissamenleving*. Verkenning (No. 20020458/625). Den Haag: Onderwijsraad. Onderwijsraad. (2003). *Werk maken van een leven lang leren*. Advies (No. 20030322/740). Den Haag: Onderwijsraad.

6 See also Sloep, P., & Jochems, W. (2007). De e-lerende burger. In J. Steyaert & J. De Haan (Eds.), *Jaarboek ICT en samenleving 2007; Gewoon digitaal* (pp. 171-187). Amsterdam: Boom.

7 Delors, J. et al. (1996). *Learning: the treasure within*. Paris: United Nations Scientific and Cultural Organisation, UNESCO.

The concept of learning throughout life is the key that gives access to the twenty-first century. It goes beyond the traditional distinction between initial and continuing education. It links up with another concept often put forward, that of the learning society, in which everything affords an opportunity of learning and fulfilling one's potential training, retraining and conversion or promotion courses for adults. It should open up opportunities for learning for all, for many different purposes – offering them a second or third chance, satisfying their desire for knowledge and beauty or their desire to surpass themselves, or making it possible to broaden and deepen strictly vocational forms of training, including practical training.

And less lofty but arguably more to the point, the Open University of the Netherlands (OUNL) in its 2006 mission statement *Growing through lifelong learning* claims:

The Netherlands must make the transformation to a knowledge society and economy. Lifelong learning is the new standard. [...] Linking up with formal education, an expansion is needed to forms of education, that are not primarily aimed at acquiring diplomas, and to education that recognizes competencies that have been gained elsewhere and in alternative ways.

The OUNL has put its money where its mouth is and in 2007 set up the *Netherlands Laboratory for Lifelong Learning* (NeLLL), an interdepartmental programme in which the expertise centres CELSTEC and the Ruud de Moor Centre collaborate with OUNL faculty staff on lifelong learning in joint research projects. Similarly, since 2007 the OUNL has been heading a task force of the *European Association of Distance Teaching Universities* (EADTU), which devotes its attention to lifelong learning issues, in particular the specific contribution distance teaching universities may make to it⁸.

An analysis and recommendation similar to the one already cited, has been made by a group of experts educators and ICT specialists in education. In 2005, they wrote the so-called Stellenbosch Declaration⁹, named after the location in South Africa where the 8th World Conference on Computers in Education was held. The group was concerned about the 'the integration of ICT in Education as a resource for both better teaching and learning and as a preparation of citizens for the Knowledge Society'. Out of this concern grew the declaration, which contains several very sensible recommendations. Without downplaying the importance of the others, here I will focus on the ones that matter most in the present context. First, the group notes that (p.2)

In the Knowledge Society, the Learner is not only the formally enrolled pupil or student. Lifelong learning has become an essential component of the Knowledge Society, and Education must take this into account. Every learner is a lifelong learner who needs to adapt to the knowledge-based society and actively participate in all spheres of social, cultural and economic life, taking more control of his/her future. The content and the methods of initial education must take into account preparation for lifelong learning. This gives Schools and Educators a new role and mission. ICT is a key tool for developing lifelong learning.

8 Sloep, P., Boon, J., Cornu, B., Klebl, M., Lefrère, P., Naeve, A., et al. (2008). A European Research Agenda for Lifelong Learning. Paper presented at the EADTU Annual Conference 2008. Lifelong learning in higher education: networked teaching and learning in a knowledge society. September, 18-19, 2008, Poitiers, France.

9 Cornu, B. & Wibe, J. (2005). The Stellenbosch Declaration. ICT in Education: Make it Work. Stellenbosch, South Africa: International Federation for Information Processing (IFIP).

Having established the direction education is taken and the role ICT should have in it, the group concludes that (p.3)

One main characteristic of the Knowledge Society is being networked and this means that many activities are no longer organised in a hierarchical or pyramidal way. [...] In a network structure, there are generally several ways to go from one point to another; a network is interactive, and permanently evolving. Networks in Education offer many ways to access knowledge, offer many possibilities for networking people and developing collaborative work and enhancing the “collective intelligence”.

And finally (p. 3)

The development of ICT-based education and training processes is a growing reality. Evidence of this can be seen by progress made in distance educational and training systems, the development of Virtual Universities, the development of a variety of learning environments, and in the drive towards the definition of standards for the field of e-learning. Corporate training and professional re-skilling systems are other areas in which important developments have taken place. There is therefore a need to continue research work on the development of these technologies and their applications.

The Stellenbosch Declaration keenly captures the various societal and economic realities that underpin the present Programme as well as draws attention to the need for the kind of research that is proposed here.

5. Collaboration within the Programme, management of its themes

Discerning within the Programme as a whole three Themes with corresponding research and development activities as well as Programme-wide valorisation activities brings with it the risk of a lack of focus and coherence. Organising collaboration at the programme level should prevent this from occurring. Two approaches may be discerned, within themes and among themes.

Themes not only serve as subdivisions of the Programme's content, they also act as focal points for particularly the research and development activities of the Programme members. As valorisation often draws upon several kinds of expertise, the subdivision of people in clusters in this case makes less sense. Nevertheless, a cluster should by each individual programme member be considered a kind of home base, stimulating thematic commitments (*cf.* section 13) and acting as a locus for collaboration. The theme leader, a senior researcher, acts as a Cluster Leader. That is, he or she sets up and co-ordinates research projects that elaborate and innovate the theme focus; he or she initiates and oversees the development of relevant artefacts, usually software applications. Such activities are always undertaken in the form of projects, whether they are externally or internally funded projects, whether they are Ph.D. projects or R&D projects by staff members. Staffing is organised by the responsible Cluster Leader in consultation with the Programme Leader (*cf.* 8). Collaboration within Ph.D. teams is organised in the usual way, through a daily supervisor who oversees the day-to-day activities of the candidate and the supervisor who bears the ultimate responsibility. Collaboration in the R&D project teams is overseen by a project manager. The project manager is appointed by the Cluster Leader and Programme Director jointly. Project managers are primarily answerable to the Cluster Leader. Valorisation projects cut across themes. They are also headed by a project manager, appointed by the Valorisation co-ordinator and Programme Director jointly. Valorisation project managers are answerable to the Valorisation co-ordinator (Figure 2).

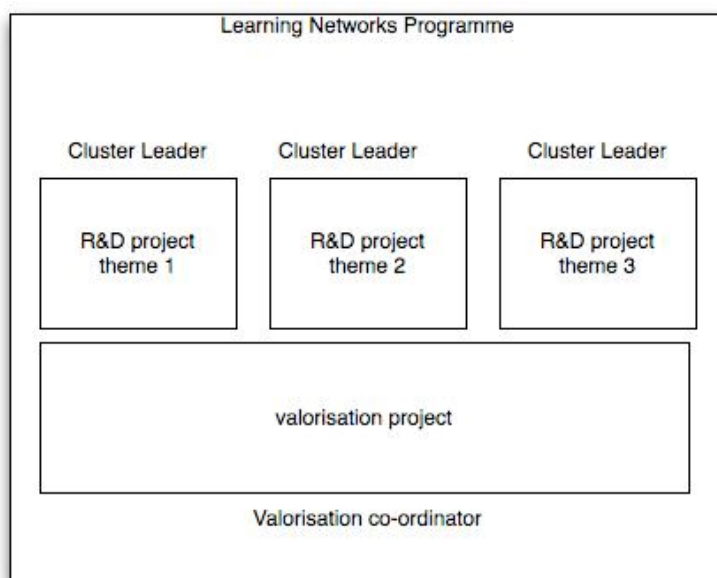


Figure 2. Projects in the Programme

To ensure the coherence of the cluster, cluster members meet weekly to discuss progress of current research, development activities, to plan new activities, to identify needs for professional development (cf. 13), etc. A running record of these meetings will be made, not only internally to keep track of what goes on within a cluster but also as a means of informing others within the Programme (cf. 9). *To that end, each theme maintains a collaboration site as part of the Programme's Moodle site <tdp.learningnetworks.org>. However, it is recommended that the site also be used as a repository for documents, to keep track of the status of its publications (in preparation, submitted, in press, published; to what project the output contributes) and any other information that needs to be shared within the theme or the Programme. Parenthetically, publications themselves, as soon as they are submitted to a journal, should be stored in DSpace (cf. 9).*

Emphasising themes and clusters as the units of content and staff-related coherence may easily lead to the Programme being split up along thematic lines, which would hamper collaboration between thematic clusters. This is undesirable as it stands in the way of achieving the goals that have been set at the programme level. It would also be detrimental to creativity, as this always thrives on the exchange of ideas between people who have differing vantage points, as will be the case for people inhabiting different themes. However, as already indicated, valorisation activities will usually transgress cluster boundaries as they draw upon the expertise of each theme. This is particularly true for valorisation projects that aim to build a Learning Network for a customer. By definition, all clusters need to be involved in this. Such projects therefore also serve to bring coherence to the Programme. A Valorisation Co-ordinator has been appointed who initiates and co-ordinates the acquisition, execution and completion of valorisation projects. Staffing is taken care of in consultation with the Programme Director. Valorisation Projects may transgress the boundaries of the Programme and demand collaboration with people from other Programmes. Such projects should always be discussed with the Programme Director.

Valorisation projects, but also R&D projects, that involve people outside CELSTEC, as for instance is the case with EC funded projects, will usually deserve their own web presence. *In such cases, preferred URLs are of the form <acronym-project.org> (cf. 9).* Furthermore, as typically partners to such a project need to collaborate intensely and as they are often separated by large physical distances they should be equipped with their own, project-specific collaboration and

communication facilities. *URLs for such sites should preferably read <partners.acronym-project.org>, making the link to the project's communication site immediately obvious (cf. 9).*

The Programme as a whole is led by the Programme Director, who should avoid that a split along thematic lines occurs. Furthermore, the Valorisation Co-ordinator is responsible for acquiring of and reporting about valorisation projects. The Cluster Leaders and the Valorisation Co-ordinator (cf. 10) meet on a monthly basis, chaired by the Programme Director. They discuss current and prospective research, development and valorisation activities. Progress, or lack thereof, made in both Ph.D. projects and valorisation projects, is on the agenda. Also staffing matters of Ph.D. and valorisation projects are discussed here, (cf. 13) as are output targets (cf. 12). As a group, they act as the programme management team. Cluster Leaders, Valorisation Co-ordinator and Programme Director, assisted by the programme secretariat, form the programme's management team. The Programme secretariat keeps records of the meetings of the management team, assists in a variety of ways the progress of the programme's projects; it also keeps track of the programme's output (cf. 12). The management team meetings are complemented with roughly three-monthly plenary meetings for the entire programme populace. These serve to update everyone both on the management issues and on the progress of PhD and valorisation projects.

The Learning Networks Programme attempts to blend communities for (non-formal) learning with professional communities. This prompts the plausible question to what extent it would be advisable and opportune to organise the programme along the lines of a Learning Network. It would certainly be advisable, as it provides an invaluable means of obtaining first-hand experience with such Networks, which translates into a stronger foundation for both research & development and valorisation endeavours. However, timing of the moment at which this should be attempted is crucial. The Programme is a work in progress, with established ways of working and interacting; it is part of a larger organisation which sets constraints to what is feasible. When a transition is attempted, it should be surrounded by no fewer cautionary measures than would an implementation with any client. At present, as the Programme is still evolving, a full-blown transition would be premature. However, elements of it will be tried out continuously, ultimately to lead to a Learning Network structure for the Learning Networks Programme.

6. Collaboration within CELSTEC, with other programmes, and within the OUNL

The present Programme together with the programmes on *Learning Media* and *Learning & Cognition* as well as the *CELSTEC Education & Training Institute* should contribute to the overall CELSTEC mission of i) researching new methods and technologies for the advancement of adult learning, ii) widely sharing of research results, and iii) helping other organisations to make good use of these results (*cf.* 1 above). It is CELSTEC's *management team* that ultimately sees to it that the programmes contribute to this mission. To that end, it sets targets and formally approves projects. The CELSTEC *operations team* (bedrijfsbureau) provide assistance to the programmes in matters of finance, contracting; the *human resource manager* allots people to programmes on a semi-permanent basis (Figure 3). All contracting matters (new staff, termination and expiration of contracts, etc.) are done by the human resource manager. However, the programme director is responsible for the allotting of scientific personnel to projects. All staff has one and only one programme as his or her home-base. To maintain coherence of CELSTEC as a whole, which allows the exchange of people between programmes if needed, CELSTEC organises plenary meetings on a three-monthly basis.

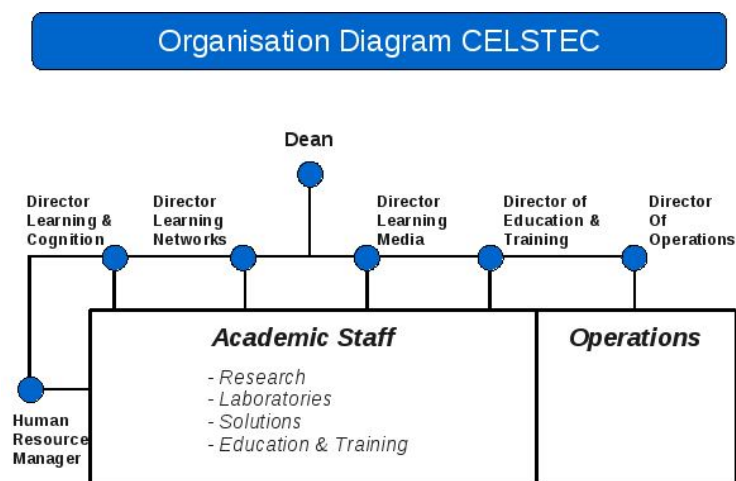


Figure 3. The CELSTEC organisation.

Collectively, the programmes and master may cover the entire mission, however this does not guarantee that individually there is no more overlap than needed to sustain the individual programmes. A potential area of overlap with the Learning Media Programme is its focus on the social web (Web 2.0), which through its social dimension bears similarity with the notion of a Learning Network. However, the Learning Media Programme takes a decidedly content (media) inspired view, whereas in the present Programme the network and its capability to form and maintain constituent communities is the focus. This is also why the topic of Learning Design and work on the IMS Learning Design specification will predominantly be carried out in the Learning Media Programme. There will no doubt arise areas of common interest, perhaps even overlap.

These conflicts will have to be resolved on a case-by-case basis. The Learning Media's present focus on technology development as well as its establishment of a multimedia lab provide ample opportunities for collaboration with the present Programme and its historical inclination to actively develop software artefacts. Particularly facilities that the Multimedia Programme makes available through its lab to CELSTEC and the OUNL at large, should be made use of. At least, the present Programme should be keen to avoid duplication of efforts which is not unlikely to happen in view of its past and present dealings with software development work. The potential for overlap with the Learning & Cognition Programme seems smaller and pertains to the competence building theme in particular, particularly the assessment of competences. However, since the Learning & Cognition Programme focuses on formal learning at the level of the individual learner in contrast to the present Programme's focus on non-formal learning at a group level, productive cross-fertilisation is to be expected, rather than unproductive duplication of activities. With the Education and Training Institute and its Master in the Learning Sciences many areas of common interest exist. First, spreading the word about the tools and guidelines are developed in the present Programme is done through papers, scientific and professional, presentations and key notes, but also through courses. Courses and workshops - at least one per Programme theme - are part of each Programme's valorisation task. The Education and Training Institute serves as the preferred outlet for this kind of valorisation. Second, although formal in nature, the distributed nature of the way in which the master students learn, makes the master well suited for the deployment of tools and services developed by the Programme. Finally, researchers employed by the Institute may participate in projects and themes of the Learning Networks Programme.

For any of its activities - research, development and valorisation - the Programme is open to collaboration to other parties in the OUNL. A prime candidate is the Netherlands Laboratory for Lifelong Learning (NeLLL). In part II of this document, the intimate link between non-formal learning, the present Programme's focus, and lifelong learning, NeLLL's focus, is detailed. Whatever the present Programme researches and develops with respect to non-formal learning is bound to have relevance for lifelong learning. This is also why for its valorisation activities, lifelong learning is its most important context. This intimate tie is reflected in the Programme Director leading programme line 2 of NeLLL, entitled *Lifelong Learning: Tools and Guidelines for Learning Networks*. To boost its research efforts, a link with NeLLL is important, both through the contacts that NeLLL generates via its other programme lines and in terms of additional funding. Part II also clarifies how the results of the present Programme may hold valuable lessons for formal learning. This should be of interest to the OUNL's faculties and, *vice versa*, the problems faculties experience in shaping their education may be valuable sources of inspiration if not valorisation opportunities for the Programme. Such links will be explored actively, through the NeLLL programme line 2, but also independently thereof. In addition to offering an opportunity for valorisation, the links with the Informatics faculty encompass the providing of opportunities for their bachelor students to take up relatively isolated software development opportunities. Finally, particularly if it comes to valorisation activities that pertain to the Dutch secondary education sector, collaboration with the Ruud de Moor Centre will be sought.

7. Quality control

SEP

In 2007, the Learning Networks Programme, as well as the Instructional Design Programme, have had their quality assessed. The protocol used for this is the so-called Standard Evaluation Protocol, published by among others the Dutch Royal Academy of Sciences.¹⁰ It aims to improve the quality of research and to make research organisations more accountable for the way they spend public funds. It consists of a self-evaluation every three years and an external evaluation once every six years. The same periodicity is followed by this Programme, which also lasts for six years. The research evaluation and programme life are phase-shifted by two years, with the previous external research evaluation having taken place in 2006 and the next self-evaluation due in 2009. This is not seen as a serious drawback as, this way, it can be avoided that a new programme comes up for evaluation.

The main assessment criteria used in the evaluation are

- Quality (international recognition and innovative potential)
- Productivity (scientific output)
- Relevance (scientific and socio-economic impact)
- Vitality and feasibility (flexibility, management, and leadership).

To quote the protocol (pp 9 - 11): ‘*Quality* is to be seen as a measure of excellence and excitement. It refers to the eminence of a group’s research activities, its abilities to perform at the highest level and its achievements in the international scientific community. It rests on the proficiency and rigour of research concepts and conduct; it shows in the success of the group at the forefront of scientific development. [...] *Productivity* refers to the total output of the group; that is, the variegated ways in which results of research and knowledge development are publicised. Usually, quantitative indicators measure this. In most cases this will be bibliometrics, which are indicators concerned with publications and citations of publications. [...] *Relevance* is a criterion that covers both the scientific and the technical and socio-economic impact of the work. Here in particular research choices are assessed in relation to developments in the international scientific community or, in the case of technical and socio-economic impact, in relation to important developments or questions in society at large. [...] *Vitality and feasibility* refers to the internal and external dynamics of the group in relation to the choices made and the success rate of projects. On the one hand, this criterion measures the flexibility of a group, which appears in its ability to close research lines that have no future and to initiate new venture projects. On the other hand, it measures the capacity of the management to run projects in a professional way. Assessment of policy decisions is at stake, as well as assessment of project management, including cost-benefit analysis. ‘

In 2005 an external evaluation was conducted on the then Research and Development Programme (*Learning Networks for Lifelong Competence Development*) and the then Instructional Design Programme (*Instructional Design for Open Tasks, Environments and Communities*), covering the years 2002-2005. Both programmes participated in the (external) *Research Assessment Pedagogics and Education Science 2002-2005*, even though the research of the LN research

10 Standard Evaluation Protocol 2003 - 2009 For Public Research Organisations, VSNU, NWO, KNAW, 2003.

www.knaw.nl/publicaties/pdf/90000091.pdf

programme ill-fitted with that of the other participants. Unfortunately, due to its interdisciplinary character and novel research agenda, perfect fits will be impossible to come by. So for the time being at least participation in this assessment effort will be continued, starting with the writing of a self-evaluation report in the second half of 2009. The committee's assessment of both programmes was quite positive, leading to qualifications of *very good* and *excellent*, respectively. Focusing on the R&D Programme, it scored *very good* (4 on a 5-point scale) on all of the criteria *quality*, *productivity*, *relevance*, and *viability*¹¹. Although this is a score not to be frowned upon, there is clearly room for improvement.

With respect to quality, the committee noted that '[t]he programme is to a large extent externally funded. This shows the success of the programme but may in the future also threaten its coherence when priorities of funding bodies are no longer in line with the priorities of the programme'. Diversification of funding sources will be sought in the present Programme as a way to overcome this problem. A focus on national and regional funds as well as participation in regional and local projects is one of the aims. Although in part this concerns valorisation, funds thus acquired will help to fund research projects by Ph.D. and staff. First, to achieve diversification, a Valorisation Co-ordinator has been appointed. Second, increased funding for Ph.D. students through national (NWO) but particularly European research funding bodies will be sought. The interdisciplinary and novel character of the programme, already mentioned, hampers pigeon holing with existence funding programmes though. However, a long-term effort to increase the programme's presence particularly in the SIKS research school (see below) will be used to foster the strategic alliances that are a pre-requisite for success in this area.

The committee was satisfied with the Programme's productivity, though noted that '[t]he number of Ph.D. theses is low at this stage'. The committee admits that this is a reflection of the youthfulness of the programme and foresees an improvement. For the present plan, this increase in numbers will materialise although there is no reason to be complacent. With a few of the Ph.D. students that entered the previous programme as part of the TENCompetence project having left prematurely, measures to improve productivity are needed. These are to be found in a more intense involvement of the supervisor and daily supervisor in the all important first phase of proposal development, and a more careful process of recruitment and selection. There is no reason to suppose that the overall process as described in the CELSTEC Ph.D. Guide (four papers in four years, roughly one every year; go or no-go after the first year) needs to be altered.

With respect to relevance, the committee had little to add, other than that its participation in the Netherlands Laboratory for Lifelong Learning (NeLLL) was applauded (*cf.* 6). As to viability, the committee felt that 'the programme seems to have a bright future', although [it] might experience some difficulties to attract good people. Quite in general, the committee concluded: 'The Programme on 'Learning Networks for Lifelong Competence Development' has been a very successful Programme with great merits in the domain of educational technology. Continued European funding, good embedding in NeLLL and an appropriate HR-policy may ensure the further success of the programme'. Finally, as it was one of the review committee's general conclusions that 'the SEP-guidelines for the self-evaluation reports do not yet play a sufficiently prominent role in the internal quality assurance systems of the research institutes and faculties', these guidelines should be taken at heart by every single member of the programme. Maintaining a personal website containing a list of publications and other academic reputation data is one way (see also 9) and being punctual with respect to logging publications, and their status is imperative (see also 9). The

11 QANU / Pedagogics and Education Science 2002-2005, report to the university boards, p 55 et seq.

introduction of a research management system, considered at the level of the OUNL as a whole, would certainly help meet the committee's complaints at future visits.

Research Schools

CELSTEC as a whole participates in two research schools, SIKS (School for Information and Knowledge Systems) and ICO (Interuniversity Centre for Educational Research). On the whole, the Learning Networks programme and the Learning Media programme mainly participate in the SIKS school, the Learning & Instruction Programme mainly in ICO. This difference in emphases has led to a natural division of labour: the Learning Networks Programme represents CELSTEC in SIKS, the Instructional Design does so in ICO. For the time being, it is best to maintain this division of labour. But the Learning Networks Programme does not foresee nor intend to withdraw from ICO fully. It is up to the individual researcher and his or her supervisors to see where a particular Ph.D. project fits best, and which school offers the best opportunities for further professional development. Generally speaking, the research evaluation committee (see above) felt that participation in research schools is important: 'The Dutch Research Schools represent a measure to improve quality and to guarantee a high level of training relatively independent of the local situation, and as such seems to be successful when compared with the less advantaged situation in other countries.'¹² Therefore continued participation is seen as a necessity from a quality assurance vantage point. Unfortunately, the trend to favour university-bound graduate schools over national research schools continues, goes against the grain of this advice. The OUNL in particular, being a small university, would stand to suffer from the complete disappearance of national (or international) research schools.

Indeed, participation in research schools is not a mere defensive move, it offers important opportunities. First, and foremost, the Ph.D. students are able to follow courses that otherwise would have been inaccessible or too costly. Second, they meet with fellow Ph.D. students, which widens their horizon. At the level of the Programme, contacts made in the research school are useful when considering collaboration, which in its turn comes in handy when exploring funding for both research and valorisation (see under SEP). More specifically, the Programme aims to strengthen its ties with the *Web-based Information Systems* research focus of the SIKS research school. This applies particularly to the Programme's Learning Network Support Services theme, as this heavily relies on the language technologies that this focus studies (see part II). However, stronger connections with individual researchers in the SIKS foci on *Agent Technologies*, and *Enterprise Information Systems* should be attempted. Their research has produced results that may be useful in the context of the question of how to set up an adequate architecture for a Learning Network. Ultimately, CELSTEC should aim to lead a programme focus of their own. The programme's Professional Community theme is a candidate, as this does not seem to cut across the present SIKS foci. The next revision of the school's programme plan (no specific date foreseen yet) offers a natural occasion to do so. Finally, the present Programme's Professional Development theme, apart from its link to SIKS for supporting technologies, should attempt forging more intimate ties with either the ICO theme on *Innovative Learning Arrangements* or on *Assessment, Evaluation and Examination*.

¹² Ibid. p. 11

8. Guaranteeing relevance over time

In hindsight, a programme plan will inevitably prove to be a mixture of deep and prophetic insights and ephemeral, fashionable trends. The present Programme plan is no exception to that rule. This however necessitates a regular assessment of its relevance and validity. The quality control mechanisms discussed under 7 also provide a powerful incentive to do so. At mid-term, after three years, minimally an adjustment is called for, as a result of the quality control assessments that are made every three years, either in the form of a full site plus self-assessment report or a self-assessment report only. However, a three-yearly interval lasts too long for the Programme to remain relevant and on top of new developments. Besides, not only external drivers may make the plan (in part) obsolete, internally generated changes of conviction, ensuing from the programmes' own research efforts, will do so too. Therefore, on a yearly basis, the Programme will be evaluated. The following mechanism will be used.

The overall Programme plan - the present document - will remain unchanged so as to provide a stable foundation. At most, annexes by be attached to this management part to indicate what procedures, targets and organisational measures have become obsolete and replaced. As discussed, the Programme recognises three themes. Quite on purpose, the theme descriptions in the academic elaboration - part II of this plan - have been kept short so as to leave room for expansion and detailing. This will be done in *activity plans*, one for each theme. Ensuing the Programme plan's formal acceptance, the activity plans will be developed. They are no project plans in the ordinary sense of the word, with milestones, deliverables and resource allocations. Rather, they describe the suite of project-based activities that can and should be carried out under the flag of the theme in question. They also provide the common denominator for the staff involved in a theme. Every year, each theme's activity plan will come under scrutiny. Does it still provide an adequate translation of the Programme plan's theme description? Have interesting and important new research and development topics come up, have priorities of funding bodies and partners in society at large changed to the extent that this jeopardises a theme's ability to find resources for its validation projects? A yearly update to the activity plan will provide the answer to these and similar questions. If little needs to be changed, an annex suffices, otherwise a rewrite may be necessary. Whatever the case may be, by taking stock on a yearly basis, the Programme may be guaranteed not to drift away too far from what its wider environment considers relevant research, development and valorisation issues. Each autumn, such an evaluation will be attempted, resulting in the availability of adjusted plans at the beginning of each calendar year.

The activity plans form the basis for the formulation of the subordinate project plans, with deliverables, milestones and staffing requirements. Being a project organisation, CELSTEC only commits staff to externally reviewed and subsequently approved projects. Project plans come in three kind. They may be projects paid for by base funding the OUNL makes available to CELSTEC directly (10 f.t.e. is the current Learning Networks base capacity); they may be Ph.D projects specifically, paid for by research grants from research organisations such as NWO; or they may be projects paid for by public (European, national, regional) or private (corporate) organisations that make grants available to further their specific, research or research related interests¹³. Project plans of the second and third kind will usually have been reviewed since the funding agencies are in the

¹³ In the Netherlands, the university base funding is referred to as 'eerste geldstroom', grants from research organisations are called 'tweede geldstroom' and non-research grants 'derde geldstroom'.

habit of demanding a full-fledged project plan before approval of the funding. Project plans of the first kind will as a rule not have been reviewed yet. Hence an external review needs to be set up. Reviewers are proposed to the Programme Director, who then invites two reviewers of repute. Subsequently, the Programme Director approves the plan, after the reviewers comments have been accommodated. Then it is submitted to the CELSTEC management team, which assesses the financial and staffing consequences before approval. These kinds of project plans should be lean on managerial details and rich on scientific underpinning. After all, as no compromising with external stake holders is needed, as in externally funded projects, they are the most important means of keeping the Programme on track. The research co-ordinator has written a document that describes the procedure for writing and submitting research proposals. It also contains a project plan template. Project plans for valorisation activities follow the rules of what is commonly considered a good project plan, but are obviously also subject to the clients wishes and demands.

9. Communication

A research, development and valorisation programme that hides its work from the outside world might as well be abandoned. Communicating results to the outside world is of the essence. However, maintaining internal communication, particularly between themes, does not come about automatically either and needs proper attention as well.

Internal communication mainly stands in service of efficient and effective collaboration. To this end, the Programme uses a mix of collaboration sites and meetings. The need for collaboration sites, with space for each individual thematic cluster, has already been discussed (*cf.* 5). The second instrument that is used to further internal communication, are the *colloquia*. They are organised jointly with the other CELSTEC programmes, once to twice a month, and are open to all OUNL staff as well as outside invitees. A colloquium provides an outlet to Ph.D. students but also to staff to present work in progress and receive feedback on it. Ideally, such a colloquium presentation is held before work is submitted as a journal publication or conference presentation, however this may not always be possible. New Ph.D. students, however, are much recommended to abide by this rule. It is up to their daily supervisor to see to its compliance. To the colloquia, members of other programmes and, if appropriate, faculty-based research groups are invited, again to share knowledge and stimulate creativity and innovation maximally.

For its external communication, the Programme relies to a large extent on facilities made available by CELSTEC and the OUNL. Individual programme members will be encouraged to make use of the Elgg infrastructure if not to blog on a regular basis, then at least to maintain a *curriculum vitae* that contains an overview of publications and other evidence for their research, development and valorisation activities; this includes such things as presentations given, programme committees sat on, reviews and referee reports written, projects completed. At the level of the Programme as a whole, the <www.learningnetworks.org> website is the most important outlet. Even though it may become part of the OUNL's overall web presence, which may be reflected in its look and feel, a presence of its own signified by a URL that does not bear an immediate relationship with the OUNL, should be maintained. The same argument holds for larger projects that the Programme carries out, particularly European or other multi-partner projects. Such projects deserve a presence of their own. *The preferred URL for such projects is 'project acronym-project.org'. Examples are 'idSpace-project.org', 'LTfLL-project.org'. Parenthetically, URLs for sites that foster collaboration within such projects should preferably read <partners.acronym-project.org>.* However, many of the Programme's external communication will be targeted to specific groups representatives of which the Programme meets through its valorisation activities. All these groups share the characteristic that they somehow care about networked collaboration and learning. All also believe in a bottom-up approach, at least not a purely top-down approach, for organising this. The Programme therefore discerns groups of interest along the axis of the extent to which they pre-exist as groups, as they would either as networked people who merely share a particular interest or as grouped people who belong to a particular organisation, for profit or not-for-profit. For the former, acquiring some form of stable organisation through self-organisation is the issue at stake; for the latter it is avoiding the use of top-down organisational measures that would hinder self-organisation to emerge.

Finally, the Programme will contribute to the publicity outlets the OUNL employs, such as annual reports, specific brochures, events such as the opening of the academic year (*dies*), etc. *In this respect, the DSpace-site <dspace.ou.nl> has a special role. Originally set up within CELSTEC*

by the predecessor to the present Programme, it is now used by other CELSTEC programmes as well, indeed by the OUNL at large. It thus has become an integral part of the OUNL's research infrastructure and thus should be maintained, technically and functionally, at that level, which at present is not the case. As DSpace is harvested by Narcis (formally Dare), which provides access to all academic publications in The Netherlands, it is of the utmost importance DSpace remains a reliable, stable service. As far as the present Programme is concerned, every member of the Programme should be absolutely strict in his or her dealings with the DSpace repository and abide by the rules that are laid down in a document that is available in DSpace. This pertains in particular to the timely submission to DSpace (once a paper, or report is submitted to an outside organisation, journal, funding body), to the way the fields are filled in (the description field in particular deserves attention as it should reflect the proper reference to the work according to the APA rules), and to the update of the description field and attached document file in pdf to reflect the changed status of the work.

10. Research & development as well as valorisation portfolios

Research and development portfolios

As already indicated within CELSTEC, each programme is expected to carry out research, development as well as valorisation activities, even though for historical reasons current emphases between programmes may differ. For the present Programme for example, research has always received less attention than development; valorisation, though always deemed important, has been hard to realise in practice. With the new set-up of CELSTEC, begun January 2008, these changes of emphasis should gradually disappear. Particularly, also in response to a request from the OUNL's Executive Board, people have been appointed whose brief it is to co-ordinate research, development and valorisation activities across programmes.

Research co-ordination will focus on the development of a shared Ph.D. Guide, which should ensure that Ph.Ds in different programmes are treated identically, at least to the extent that this is in their and the programme's interest. Since, a single programme may have Ph.D. candidates that fall under several research schools (SIKS and ICO), it is particularly important to maintain common guidelines per research school across programmes. For further details, see policy documents produced by the research co-ordinator, in particular the Ph.D. Guide <http://dSPACE.ou.nl/handle/1820/1802>.

Development co-ordination is essential to make sure that software artefacts may be reused to the maximum extent possible, either as part of a larger infrastructure or to continue their development. Obviously, the natural limit to such co-ordination efforts is the success of individual projects, be they Ph.D. projects or valorisation projects. However, to ensure the necessary minimum of reusability, all software artefacts and their accompanying documentation should be made available under appropriate open source and open content licenses. See for further details again the policy documents that have been produced by the development co-ordinator.

The valorisation portfolio

The Programme will also establish a valorisation portfolio. Valorisation primarily has the function to disseminate the Programme's concepts, theories and artefacts into non-academic circles, to test them *in vivo*. Hence, co-operation with regional, national and international parties - in this order of priority - will be attempted, in any of the thematic fields the Programme covers. However, opportunities to install full-fledged Learning Networks are prioritised as they provide opportunities to test ideas in settings that honour their mutual dependence. Requests to do so will in all likelihood also involve thinking about business models that may sustain a Learning Network. A variety of different models may be entertained, depending on who pays for the maintenance of the infrastructure and for the services that the network offers. At the one extreme some organisation (a corporation) may provide a Learning Network for its employees and thus pay for all costs. At the other extreme, the Learning Network users may jointly pay for infrastructure maintenance through a subscription fee and pay individually for each service offered and enjoyed. In addition to this, some of the costs may be paid for by advertisements. Obviously, which solution is adequate depends on the wishes and demands of the client. Collaboration within the OUNL is sought to arrive at fine-grained system of business models.

When engaging in valorisation a balance has to be struck between fit with the Programme's needs for field tests and financial rewards. Field test provide valuable feedback on its research and development work, financial rewards increase its capacity to engage in research and development. To make this distinction transparent, activities that are primarily aimed at financial rewards, to which commercial pricing schema applies, go under the name of *solutions*.¹⁴ They should demand little preparation, yet be of sufficiently high quality not to detract from the academic character of CELSTEC. The valorisation co-ordinator is primarily responsible for the valorisation portfolio, both for its adherence to the above guidelines and for the internal co-ordination that its execution requires (*cf.* 5, 9). As far as the co-ordination of valorisation projects across programmes is concerned, regular meetings of valorisation co-ordinators, headed by a CELSTEC management team member, ensure this. Obviously, the problem with valorisation projects that cut across programme lines will be to strike a balance between the interests of the individual programmes (*cf.* 12) and CELSTEC's overall interest to maintain the image of a reliable yet flexible partner to the outside world. This can only be done by measuring programme performance according to criteria that gives each its due.

¹⁴ For 2009 the target income through valorisation is 220 k€

11. Capacity management and non-human resources

The number of staff in the Programme is ultimately determined by the size of the university base-funding and the extent to which the Programme is prepared to act opportunistically. The university base funding pays for 10 fte tenured academic staff (See Table 1). The remainder is paid for out of external grants. As Table 1 shows, about one-third of the staff is internally funded. Nevertheless, they account for about 50% of the personnel budget. This is a consequence of the unavoidable fact that tenure is awarded to more senior and hence more expensive people. Table 1 also makes clear that a sizeable number of tenured staff (7.9 fte) is paid for through grant money. Obviously, there is a risk in hiring tenured staff on the basis of projected, non-guaranteed income derived from externally funded projects. However, not doing so would limit the the Programme's room to manoeuvre unduly. Tenured staff is needed to write proposals, hire temporary staff, supervise Ph.Ds (although some of it many be done by postdocs too). Furthermore, a sizeable part of the grant money is relatively secure as funding policies of public and private grant organisations are publicly known and changes in policies that would jeopardise income streams may therefore be anticipated and counteracted.

The ratio of tenured staff that is base funded and grant funded also depends on the degree to which the Programme is prepared to have its research policies be determined by outside forces, i.e. behave opportunistically. Obviously, if one is willing to track external policies faithfully, much grant money is at least potentially available. The present Programme, however, veers towards an attitude of self-determination, as does CELSTEC at large.

Table 1. Current and targeted numbers of staff, tenured and temporary

	current	targeted
tenured academic staff, internally funded	10,0	10,0
tenured academic staff, externally funded	4,5	5,0
postdocs	2,0	2,5
Ph.Ds	7,0	10,0
tenured, academic related staff	3,4	5,0
total	26,9	32,5

Although determining what this means in terms of numbers is no exact science, common sense and experience suggest that with 10 fte base funding, no more than 5 fte of tenured staff should be paid for by grant money. The resulting group of 15 fte tenured staff should then support a group of about 10 to 15 fte temporary staff, mostly Ph.Ds and postdocs. I've left academic related staff -

project managers, valorisation co-ordinator, software technology developers - out of this picture. This group should equal some 5 fte at the most. Totalling these figures, the Programme consists of some 30 to 35 fte at the most. In absolute numbers this figure will be larger because of part-time appointments.

Having thus determined the total size of the Programme staff, there also is an ideal ratio of full professors, associate professors and assistant professors for the group of 15. This ratio should be 1 to 2 full professors (including temporary, topic-bound, part-time appointments), 3 to 4 associate professors and 9 to 11 associates. Furthermore, 1 postdoc to at most 4 Ph.Ds seems fitting. Table 2 shows that current figures deviate somewhat from this ideal. Because CELSTEC as a whole has adopted a capacity group model, these figures are subject to change, outside the Programme's control. However, in the Table, the ideal numbers, computed on the basis of the above arguments, have been entered as well, so as to indicate the direction of change needed.

Table 2. Current and targeted numbers of professors

	current	targeted
full professors	1,0	1,5
associate professors	3,3	3,5
assistant professors	10,2	10,0

Table 1 indicates that there is some room for growth of the numbers of Ph.Ds and postdocs. To some extent, the situation is caused by the present difficulty to hire qualitative good candidates for these positions. This makes one wary to engage in yet another externally funded project as there is a significant chance that the work it brings about will need to be carried out by existing staff. There is thus a need better to advertise the Programme in order to attract qualified candidates more easily. This is probably best undertaken at the level of CELSTEC as a whole. Table 2 shows that the mix of professorial ranks is close to the ideal ratio. Some effort should go into attracting visiting professors from elsewhere or externally funded chairs.

Apart from quantitative capacity management, there is the issue of whether staff is sufficiently qualified to carry out the variety of tasks that the Programme demands. CELSTEC as a whole is still in a transitional phase, from a department that provided services to the OUNL's faculties to an R&D institute that takes valorisation seriously, inside but also outside the OUNL. This means that for some methodological skills are missing such the ability to design research and analyse outcomes (using appropriate qualitative and quantitative methods), for others it means a shortage on computer science competencies. For the Learning Network programme, particularly important are the abilities to develop numerical models and simulate them, to use social network analysis, to work UML, to mine data, and to think in terms of software agents and A.I techniques. All deficiencies will as a rule be remedied on a case by case basis, although courses may be organised in collaboration with the other CELSTEC programmes and NeLLL. Ways to fill lacunae included courses offered by the SIKS and ICO research schools, summer schools and seminars organised in conjunction with European project including networks of excellence, and in specific cases specific courses offered commercially. As far as Ph.D. candidates is concerned, their training is part of their Ph.D. trajectory. As far as regular staff is concerned, training will be part of the professionalisation

trajectory discussed every in the R&O discussions (*cf.* 13). Finally, the colloquia as they are currently run not only are means of discussing work in progress, but also contain a ‘tips and tricks’ section in which experienced staff discuss such things as presenting in public, maintaining a network, etc. (*cf.* 9).

Non-human resources

Out of its overheads’ budget, the OUNL provides CELSTEC with office space and computing facilities (Internet access, central storage, mail facilities, data back-up facilities, limited server maintenance). Office space for Ph.Ds should preferably come in the form of joint offices, as this allows the shaping of an intellectual climate that fosters creative work of high quality. For staff that only spends a few days a week at CELSTEC shared cubicles are provided. For them, but actually for the entire staff, excellent facilities to work at remote sites are of the essence. This provides the necessary coherence for a team that for one reason or other is unable to meet in person regularly. Also, a centre that writes online learning and working in capitals, should practice the ways of the online itself. This goes even more for the members of the Learning Networks Programme, whose business it is to design artefacts for online, networked learning and working. In addition to good facilities to work remotely, computer and computing resources should be available to support the R&D and valorisation work of the Programme. Facilities to experiment almost at one’s heart’s desire are therefore essential.

All of this starts with the availability of reliable and powerful personal computers that fit the user’s preferences. These preferences may imply a standard computer, which is chosen and maintained by the OUNL’s computer support department (ICTS). It may also be a computer of a brand and operation system that fits the a user’s idiosyncratic preferences. In the former case, full maintenance and trouble shooting is offered by ICTS, in the latter case ICTS should merely guarantee unhampered access to the Internet and local printers. To avoid undue overspecification of needs, a fixed, personal budget should be made available every three years, equivalent to what a standard computer costs. Additional wishes are possible but to be paid for out of one’s own pocket. Exceptions of course are to be made for project-related needs which require funds in excess of the standard budget. Unfortunately, the current situation is a far stretch from this ideal. If unremedied, this will ultimately stand in the way of the Programme’s performance. In addition the needed personal computing facilities, the CELSTEC multimedia laboratory, which is a facility shared by all programmes, offers room for experimentation. It should be noted, though, that the ability to experiment conflicts with the equally valid lab function to support CELSTEC’s valorisation, more specifically solutions, endeavours (*cf.* 12, 14).

Finally, a Programme which takes its academic reputation seriously (*cf.* 12) should provide sufficient funding for attending international, peer-reviewed conferences, workshops, seminars, etc. As a rule, a Ph.D. should present each of his or her four papers at one conference per paper. Other staff should at least once a year attend a conference and present a paper there. As a rule, also, visits of international conferences and multiple-day national conferences is only allowed if a paper is presented.

12. Output targets and reputation management

Each programme's performance is measured in terms of a variety of indicators, separate ones for research, development and valorisation. The research (and development) criteria are intimately tied to the performance criteria that the various bodies that keep a tab on the programme's quality use. Indicators for valorisation performance are not set by such bodies, but internally, though they are inspired by the OUNL's wish that CELSTEC fully engages in valorisation. Criteria always reflect both the quality and the quantity of the output produced. I will discuss targets for research, development and valorisation in turn.

Research output

Research output targets largely conform to the criteria used in the previous Learning Networks Programme. However, since both members of the SIKS and ICO research schools participate, allowances must be made for fine-tuning these criteria. The following criterion applies : 1 (one) output point is obtained for each publication, being an article in an international, peer-reviewed journal, a chapter in an international, peer-reviewed book, or an article in international, peer-reviewed conference proceedings (SIKS); or being a contribution to one of the ICO-approved outlet. Even though SIKS does not maintain a limited list of approved outlets, quite on purpose, informally such criteria exist. In an effort to be more explicit about what is acceptable and what not, the TENCompetence project produced such a list, the contents of which are overseen by a scientific committee (see <wiki.tencompetence.org>). The Programme uses this list as indicative for what publication outlets are acceptable and what not¹⁵. The list of publication outlets that ICO accepts is maintained by the ICO board and has been published online, see <www.ou.nl/ico>. Finally, participation in conferences will only be funded by CELSTEC if a paper has been submitted that has been accepted by the conference's international programme committee. Exception to this rule can be made for national conferences. Finally, as a rule journals that require payment for publication will not be eligible.

Only staff that has a doctorate degree (regular staff and postdocs), as well as Ph.D. students are expected to produce research output. As a rule, regular staff spend 40% of their time on research, postdocs 100%, and PhDs 80%. Per FTE, regular staff should therefore produce 3 output points per year, postdocs 2; Ph.D. candidates are expected to produce 1 point per 0.8 fte. They should complete their thesis in 4 years at the most, requiring an average productivity of 1 publication per year. Full-time employed staff should produce at least 1.2 articles per year, full-time employed postdocs 2. Allowances will be made for part-time employment.

Development output

The development and publication of software and specifications (open standards) will also be counted. Quality conditions are that the output i) contains code and documentation; ii) is accepted by at least two independent reviewers; iii) is made publicly available through SourceForge or the like under an appropriate open source (code) and open content (documentation) license. The reviewers determine also the size of the output in terms of article point equivalents (quantitative criterion).

¹⁵ It is a matter of some concern that no Programme members participate in the scientific committee. With the termination of the TENCompetence project, the publication policy will be re-evaluated. A larger role of SIKS seems plausible.

Technical programming (TWO) staff is expected to produce output points in amounts that reflect their participation in projects. Depending on the nature of their research project, Ph.D. students may also have to produce development output points. As a rule, these cannot be traded against article output points. However, this seeming unfairness of having to do double duty should be seen in the light of the large amount of organisational work that is required from non-developer Ph.Ds, who carry out large-scale experiments or surveys.

Valorisation output

Valorisation criteria to some extent depend on the kind of valorisation activities undertaken. Quite generally, valorisation refers to any activity that contributes to the Programme's impact on society at large and not merely its academic circles. 40% of available staff time should roughly be spent on valorisation. This applies to all academic staff with a PhD, with the exclusion of postdocs, who should work full-time on the project that pays their wages. Ph.Ds spend only 20% of their time on activities not directly related to their own research. This may be valorisation with a focus external to the Programme. However, it will often also encompass 'odd jobs' that are part of the Programme's management overhead. Whatever their exact nature, valorisation should provide a useful addition to the Ph.D's expertise. Finally, academic staff without a Ph.D. spend in principle all of their time on valorisation, although contributions to research and development are much welcomed. Such contributions may be the first stepping stone towards a Ph.D. trajectory for which then specific arrangements have to be made (see 13).

The above criterion refers to valorisation input. Its output should be assessed too, quantitatively and qualitatively. An obvious quantitative criterion is the monetary value of funded projects. Particularly projects that bring in revenues in excess of their costs, are valuable, as thus they may help bear the costs of other projects less likely to be funded. Currently such 'money making' projects are labelled 'solutions', they are targeted to earn at least 20% in excess of their costs, at a total turnover of 183k€ in 2009. The fact that, currently, about half of the Programme's staff is paid for through external funds, underscores the potential profitability of such projects. At present, most of the additional funding is acquired in the form of EU funded RTD projects. A plausible qualitative criterion would be post-project evaluations of customer satisfaction. Customers who have hired paid services should be questioned, preferably in a standardised way, about their satisfaction with the services provided. The Valorisation Co-ordinator will be asked to develop a policy for the quality assessment of valorisation projects.

Reputation management

The Learning Networks Programme needs carefully to manage its reputation. As far as valorisation is concerned, there are some simple rules of good project management and common courtesy that everyone should abide by: deliver on time and with sufficiently good quality, be straightforward but polite with partners, do not publicly defame the OUNL, CELSTEC or any of its programmes and staff even if there is ample reason to do so, etc.

When it comes to development and particularly to research, reputation management acquires a slightly different meaning. Here it is about the programme's reputation, indeed CELSTEC's and the OUNL's reputation, as determined by the collective of the programme participants. First and foremost, in one's capacity of a researcher one should behave ethically with regards to such issues as data collection, data reporting, the treatment of people involved in experiments and tests, etc. In 2004, the Association of Universities in the Netherlands (VSNU) has published a code of conduct

for scientific practice¹⁶, which lays out these principles in detail. Currently, the OUNL is about to formally ratify its own code, which pays tribute to the VSNU Code but in addition regulates such as issues as what sanctions to apply to misconduct, who is responsible for applying them, how one may appeal, etc.¹⁷ It is particularly important that Ph.D. supervisors instil their candidates with an attitude that is commensurate with the VSNU code of conduct.

On the positive side, the academic reputation of researchers is determined by his or her achievements in the academic arena. These are reported in quality assessments, in annual reports, etc. The following categories matter:

- peer reviewed publications (for criteria, see 11)
- professional (non-peer reviewed) publications
- presentations and key notes
- membership of editorial boards, programme committees, review boards, etc.
- awards
- research and development (e.g. NWO or EU FP7 projects) or valorisation funds acquired (e.g., Surf projects or contract research contracts).

To ease the compilation of such reputation data, every programme member is urged to maintain a list of involvement in any of these categories, preferably online, and update it continuously,.

Reputation is largely tied to authorship. The following rules shall apply to all publications, including presentations:

1. Whoever has non-negligibly contributed to the actual writing of a paper or its editing, or to the collecting of empirical data or the writing of programme code that underpinned or otherwise contributed to its content, shall be listed as an author.
2. The order is determined by the authors themselves. Usually, the order reflects the size of the contribution made. The first author acts as the corresponding author. He or she also manages the publication process: first submission and cover letter, resubmission and accompanying letter detailing the changes made, correcting the proofs).
3. Ph.D. candidates are always first author of papers that are meant to end up in their dissertation. Note that rule 2 dictates that the Ph.D. candidate therefore should put in the bulk of the effort! The daily supervisor is the second author, the supervisor ('promotor') the third one. Others, if any, follow these. In the case of papers by Ph.Ds a large number of authors (over 5) is not advisable, as it may prompt the exam committee ('promotiecommissie') to question the sufficiency of the candidate's own contribution.
4. Papers written in the course of a valorisation project always carry the name of the project leader, even if only as the final author, the reason being that thus the recognisability of the project is served best.
5. The Cluster Leaders and the Programme Director have a special part to play. It is no automatism that their names be added to all papers that are produced within the confines of their cluster or the programme as a whole, respectively. Having said that, the Cluster Leader's responsibility to guarantee sufficient quality for the cluster activities will often imply participation as an author; likewise though presumably less frequently so, the Programme Director will often provide sufficient material input to warrant a co-

16 VSNU (2004) The Netherlands Code of Conduct for Scientific Practice; principles of good scientific teaching and research. VSNU, Amsterdam <<http://www.vsnu.nl/web/show/id=88938/langid=42>>

17 At the time of writing, the code - Regeling wetenschappelijke integriteit - only had to be approved by the OUNL's Executive Board.

authorship. Please note, even if a Cluster Leader or the Programme Director have not been scheduled to contribute to a paper, they should be kept informed in a timely fashion so that a contribution for the sake of quality maintenance still is possible. Cluster Leader and Programme Director may appoint others as their substitutes.

13. A convivial workplace and opportunities for professional development of staff

The Programme is part of the larger CELSTEC environment, which sets many of the boundary conditions to the workplace the Programme provides. Thus, the allocation of staff to programmes rest with the capacity manager, as does deciding on the hiring of new people and the continuation of expiring contracts. Nevertheless, programmes do have a large say in human resource management issues. In principle, staff that is allocated to a programme is so on a long-term basis. Allocation within a Programme is the Programme Director's prerogative, as are issues of professional development. It is therefore correct to say that an individual's professional well-being is to a large extent determined by his or her interactions inside the Programme.

The most important reason to work with thematic clusters to which staff is allocated, is to foster the emergence of a professional identity. For this, two elements are crucial. The first is a thematic identity, a topic that is the subject of research and development activities with which one identifies oneself. This way, each individual slowly becomes connected with some area of expertise. This is necessary for the second item, a personal identity. Being identified with a particular area of expertise, a person more easily fits in with the larger research arena. This is internally so, because his or her role in projects may be more easily established, which causes fewer mismatches (by being asked for non-fitting projects) and engenders more easily a sense of being of value to the project. It is externally so, as contacts with colleagues outside of CELSTEC, in the Netherlands or abroad, become more focused and more topic driven. Thus one becomes more easily invited to participate in workshops, to write joint articles, to sit in on a programme committee or editorial board, to deliver a key note, to participate in a European project, etc. It goes without saying that, ultimately, the Programme stands to profit from these more sharply delineated professional and personal identities. But it is also to be expected that the individual members of the Programme lead more fulfilling professional lives.

Carefully allotting people to programmes and themes within it for longer periods of time is but one way to ensure the individual's professional and the programme's well-being. Individuals may have a change of heart, programme goals and ambitions (*cf.* 8) are under constant development. Currently, at the level of the Programme as a whole more expertise is needed on such topics as the educational use of such technologies as data-mining and language analysis (ontology-based and statistical), as well as on methods such as experimental design and analysis, and mathematical and numerical simulation. Hence, mechanisms must be in place to meet both the individual's wish to change and the Programme's need to enforce change. Short of letting people go or hiring new staff, wishes and needs are translated in professional development opportunities. These can be organised at a joint level, as is done within the Programme (e.g. data-mining) and in collaboration with others (TENCompetence seminars and summer/winter schools, SIKS and ICO course offers, NeLLL). If no joint development opportunities exist or if they are unavailable at the time of need, custom-made solutions for the individual in question will be sought.

Yearly, each Programme member participates in a 'result and development discussion' (R&O-gesprek) with the Programme Director. Results as well as areas for development are identified on the basis of a competence map, that acknowledges differences in area of expertise and seniority. The result-and-development-discussion cycle is part of an OUNL-wide policy with respect to proper human resource management. These meetings serve the purpose of evaluating the year that

has passed. Discussed is what results have been attained and to what extent these tally with the intended results. Also discussed is what professional development is needed, to prevent established mismatches between results intended and results obtained, but also to meet personal and programme-driven development needs. A special case forms the ambition of tenured staff without a Ph.D. still to obtain a Ph.D. The specific arrangement that once existed for such cases has expired. This does not mean that yet obtaining a Ph.D has become impossible, it only means that it has become harder. To staff who in a 'result and development discussion' have indicated their wish to write a dissertation, a supervisor and daily supervisor will be appointed. The cluster leader of the team in which the person in question participates will be informed. Together, in projects opportunities will be identified to publish papers and attend conferences. Once two or three papers have been written, submitted and accepted, to the extent that this is feasible the candidate will be accommodated in finishing the dissertation relatively quickly, by making time available for writing the introductory and concluding chapters and the final paper(s). It should be noted that this is a courtesy arrangement, not an enforceable right.

Irrespective of the 'result and development discussions', assessments may be held in order to establish whether a promotion to a higher rank is in order. Procedures for these are also guarded by the OUNL's HR department. As a special case of these, all Ph.D. candidates are assessed one year after the start of their project. This assessment serves to establish whether they will be continued to be hired so as to allow them to complete their Ph.D. or not. For more details, see the Ph.D. Guide.

14. Instrumentation

Computers, personal computers as well as servers, are essential for a programme in which technology plays such an important role. Collaboration is sought with the Learning Media Programme (*cf.* 6, 12) to make use of the Medialab facilities as much as is feasible. The team room in the current set up has been identified by the Learning Networks Programme as best in line with its goals. Attention to its deployment in R&D and valorisation projects, as well as care for its further development are activities adopted by the Learning Networks Programme. Also, the services of the OUNL, in particular its computing services department ICTS, are sought whenever a standing infrastructure is needed, such as for its public communication sites and private collaboration sites. However, given its brief to carry out development work, the Programme needs facilities of an experimental nature of its own, that it sets up and maintains itself. This will apply to Ph.D. candidates in particular. In these cases, it will always be necessary to consider the optimal way of serving their personal computing needs and their research-related needs. Sometimes, they may be combined, sometimes a dedicated personal computer and a preferably shared, server-based research infrastructure is best. To a lesser extent similar considerations apply to the other staff. They may for instance want to experiment with operating systems that are different from the standard that the OUNL supplies. For a programme such as the Learning Networks Programme, with its ambition to develop all kinds of support services preferably in open source, wishes to deviate from the standard should at least be considered seriously. Other institutions that are in positions similar to CELSTEC, such as the OU UK's KMI, follow a similarly permissive policy.

However, when discussing the possibility to let one's personal computing arrangement deviate from the OUNL's standard, two issues need to be concerned. First, as standard-issue equipment falls under the SLAs that CELSTEC maintains with ICTS, ICTS may be called upon with all hardware and software problems. But non-standard equipment does not fall under the SLAs. Therefore, help of ICTS may only be counted upon for network related issues. Second, there are drawbacks to allowing such deviations from an institutional standard, in terms of cost and time spent (the benefits show itself in terms of a greater familiarity with a variety of software and hardware installations). Therefore, the decision to deviate from the agreed-upon standard should always be argued for carefully for each individual case. One should be able to motivate the need in terms of the research and development work carried out. Also, no excessive costs should be involved, both in terms of the hardware and software, and the maintenance of the machine's integrity.

Part II Academic Elaboration

This part contains the academic underpinning of the management report part I. It is written as an academic position paper, containing a description of the Programme scope, of the state of the art, of the progress to be made beyond the state of the art, a subdivision in themes as well as references to pertinent academic works.

1. Context and ambitions

The Learning Networks Programme specifically addresses the needs of professional learners. Its point of departure are the individual professional's employability concerns, translated into competence development needs (Onderwijsraad, 2003) and catered for in ways that best serve their interests.

Traditionally, an individual's life-history can be divided up in two periods, a period in which one receives one's (often compulsory) education and an ensuing period in which the fruits of the education may be reaped through work. This admittedly simplistic scheme does not apply anymore. The advent of the knowledge society is responsible for this. In the wake of product innovation and the invention of new services, employees have to amplify, reinvent, and extend their knowledge and skills continuously (Communities, 2000; Edwards & Usher, 2001; Griffin, 1983; Longworth & Davies, 1996; Sloep & Jochems, 2007). The traditional working-only-period has become a time of working *cum* learning, of acting as a professional and developing oneself as a professional. Interestingly the old temporal divide between learning and working seems persist, in that, while working, professionals set time apart to learn, either on their own accord or upon request from or insistence of their employer. Professionals will elect to 'follow courses', employers will organise such courses for them, often at secluded, far-away locations to sweeten the pill. However, there seems to be no obvious need for duplicating the old divide in the modern, professional development context. Indeed, there are arguments to the contrary. Two mention just two, as a matter of sound pedagogy, new things had better be learnt in the context of their intended application (Van Merriënboer, 2005); practically, finding an empty slot in one's diary, let alone in the diaries of several people, proves hard if not impossible. These and similar arguments would suggest that an integration contexts of learning and working make much sense (Sloep et al. 2008). Exactly this is what Learning Networks attempt to do. In them, learning should imperceptibly grade into working and *vice versa*; the notions of a community of learning and of a community of practice should be merged into a community of learning *and* practice. The denizens of a Learning Network Learners should constantly and unconsciously switch between a learning mode and a professional mode, at some times engaging in activities that stimulate their development, at other times in activities that further their professional lives.

Even though Learning Networks are primarily an environment for competence development and hence learning, their context should be determined by professional needs and demands, not educational availabilities and conveniences (Cornu & Wibe, 2005). So, it is assumed that there are cohorts nor curricula, that learners enrol at their convenience; and that educational service providers, public as well as private educational institutions, will be involved in helping the individual to fulfil his or her needs. These assumptions amount to the adoption of non-formal modes of learning¹⁸ and the Programme postulates that such modes, embodied in a Learning Network, provide the best possible environment for professional learners to fulfil their competence development needs. Clearly, substantiating this claim by appropriately designing Learning Networks encompasses the prime ambition of the Programme.

Although the above characterisation of a Learning Network as an environment particularly suited to non-formal learning may seem to indicate that the Programme has nothing to offer to formal learning, this would be too hasty a conclusion. In formal education, particularly in formal vocational learning, one tries to move away from the traditional push model, with its emphasis on

¹⁸ Note that it is distinct from informal learning, which I consider to be all the learning we do on a daily basis, unintentionally. Thus the categories of formal and non-formal learning always refer to intentional learning activities.

cohorts of students that have been synchronised in their development and on curricula that homogenise students' learning paths and goals. Attempts are being made to embrace a pull model, which focuses on non-formal learning, does away with cohorts and curricula and treats learners as individuals, with, in terms of their capabilities, individual histories and goals (Anonymous, 2007). Unfortunately, much of our current expertise, particularly in universities and other HE and FE institutions, is with the push model. So promoting a pull model requires a rethinking of much conventional wisdom. This pertains to many of our traditional educational assumptions, but also to the organisational aspects of the educational universe that is needed (which might well overstep the boundaries of traditional educational establishments), and to the business models that underpin the economic viability of such a universe. Thinking in terms of Learning Networks allows us to break away from conventional wisdom, precisely because several of the traditional assumptions that one surreptitiously makes are abandoned or at least questioned. It is because of this unconventional attitude that the Learning Networks Programme may hold valuable lessons for formal learning too.

Furthermore, the focus on non-formal learning in networked contexts implies that the Programme emphatically also seeks to assist lifelong learners. Indeed, one may argue that all those who develop their competences in the context of a Learning Network are *a fortiori* lifelong learners. Furthermore, the notion of lifelong learning covers someone's entire educational career, from his or her initiation in learning in specific, usually collectively funded institutions ('schools') for initial education up to his or her engagement in learning activities that are organised by employers or are self chosen. Admittedly, the latter activities may be formal or non-formal, depending on the individual's and his or her employer's preferences and finances. Hence, not all lifelong learners will need to do so in a Learning Network setting. However, as a corollary to the thesis that non-formal learners are best served by a Learning Network setting, to the extent that lifelong learners - as a private person or employee - adopt a non-formal approach to learning, they had better do so in Learning Network-like settings. Targeting lifelong learners alongside with non-formal learners brings the Programme's ambitions in line with the ambitions that are phrased in several policy documents, ranging from for example the Memorandum on Lifelong Learning the staff of European Commission has formulated (Communities, 2000) to the OUNL's own mission statement (cf. par I - 4). These documents all share the ambition to pave the way for the impending knowledge-based economy and society.

2. Theoretical underpinnings

In line with the above, a Learning Network is stipulatively defined as a particular kind of online social network, one that is designed to support non-formal learning in a particular domain. The domain specificity is added as it is likely that domains will constrain the design of a Learning Network in ways that are specific to the domain. This does not detract from the general usefulness of the notion as non-formal learners who participate in a particular Learning Network will most likely do so because they share an interest in a particular broadly-defined topic, i.e., domain. I furthermore assume that each domain may be individuated by the existence of a comprehensive competence map that is specific to the domain. Although presumably several, not necessarily equivalent competence maps may be devised, each Learning Network should have at least one.

Typically, the interests of a particular non-formal learner are quite specific. He or she will want to develop particular competences and not others, motivated by professional or personal development plans. We therefore assume that non-formal learners do not necessarily have much in common. Indeed, they are unlikely even to know of each other's existence other than by accident. We thus assume that they have no explicit intention to collaborate with each other. Hence, a Learning Network may not be equated with a community. Over time, a Learning Network could acquire community-like characteristics and become a genuine social network, but these characteristics only are expected to emerge and evolve during its lifetime (*cf.* Shafer & Anundsen, 1993).

To further elaborate this point, there is a significant difference between learning in a Learning Network and learning in Computer Supported Collaborative Learning environments. In spite of the shared online character and the reliance on computers, Learning Networks may be designed, however, their community characteristics only emerge as within the network communities arise; learning activities (learning tasks) will be incorporated in them, however, they are not imposed but self-chosen by the learners; finally, a division of labour may be advantageous in particular learning activities, but is not there by design and, rather, emerges by voluntarily agreement (Jochems, 2002).

But a Learning Network can only acquire social aspects, can only become a genuine community (or collection thereof) if the learners take notice of each other and begin to interact. Without interactions a Learning Network remains a mere grab bag of self-centred individuals. But why would learners in a Learning Network collaborate at all? There are two distinct ways to answer this question, the first points to long-term, ultimate factors, the second to short-term proximate factors. Addressing ultimate factors, there is ample evidence that collaboration and a social setting significantly improve learning effectiveness and learning efficiency. By collaborating with others, learners cast off their initial isolation, make use of their collective intelligence, motivate and enlighten each other and thus improve their learning outcomes (Allen, 2005; Cartney & Rouse, 2006; Chapman & Ramondt, 2005; Keppell, & Au, 2006). They may be said to become part of a community of learning. The second reason for learners to collaborate becomes evident if one looks at a Learning Network as a network for knowledge sharing. This makes sense as learners who collaborate with others not only consume explicit knowledge held in documents but also use their fellow learners as sources of implicit knowledge (Nonaka & Takeuchi, 1995). If this knowledge exchange extends beyond the educational realm into their professional life, a Learning Network qua knowledge sharing community may thus become a professional network, with the characteristics of a community of practice; or, more precisely, the communities of learning the Learning Network consists of may acquire characteristics of communities of practice (Wenger, 1999). As argued,

typically learners in a Learning Network combine their need to learn with the necessity to work. Indeed, their learning needs often derive from their occupation. So there is every reason to expect that the communities that arise in the Learning Network will acquire the dual nature of both communities of learning and communities of practice (*cf.* Brown & Duguid, 2000; Longworth & Davies, 1996). It is particularly the gaining of access to a (widening) community of practice that could entice learners to collaborate with others. Obviously, this is a perspective that of and in itself is valuable to lifelong learners as well, be they professionally or personally inspired.

Both these explanations for why it is in the interest of learners in a Learning Network to collaborate point out long-term, ultimate benefits. They do not explain why a specific learner in a specific situation would behave altruistically and help out his peers. Note that such behaviour is needed for a community to arise and thrive. Even worse, the prisoners dilemma points out that individuals can get away with reaping the ultimate benefits without contributing proximately: one can rely on the help of others without providing help to others oneself. However, this situation rapidly changes for situations in which players repeatedly meet each other (the iterated prisoners dilemma). Under a wide variety of strategies, ‘cheaters’ will rapidly be ignored and collaboration will arise spontaneously. Neither top-down imposed ‘contracts’, nor incentive or punishment schemes are required. It is only necessary that i) the participants are individually identifiable to each other when they meet again in the future, and ii) expected future behaviour to a large extent determines present behaviour. This way, participants can prevent cheaters to benefit without contributing themselves (Axelrod & Hamilton, 1981; Poundstone, 1992). As a starting point, we may therefore safely assume that learners in a Learning Network are egocentric learners and yet collaboration will arise (see also Kollock & Smith, 1996, 1999). This assumption may actually be too strong as there is evidence that people will act altruistically without expecting immediate returns (*cf.* Koopmans, 2006). Furthermore, several additional measures may be taken to stimulate collaboration (Berlanga et al., 2008; Kester, Sloep, et al., 2007; Sloep et al., 2007).

These arguments for considering a Learning Network as a social network derive from the learner perspective only. However, there are reasons why it is imperative to view a Learning Network as a social network. From the perspective of those who maintain and support a Learning Network, some forms of collaboration are simply needed to make maintenance and support economically viable. Consider the costs of staff time needed to tend to questions individual learners may have on all kinds of issues, content-related and procedural. With the heterogeneity of learner backgrounds and learner demands, institutional support for such learners in the form of tutors, helpdesks, mentors, etc. rapidly becomes prohibitively expensive (Anderson, 2004; De Vries et al., 2005; Fox & MacKeogh, 2003). Therefore, to a large extent learner support should emerge from the group of learners themselves rather than be provided through paid, institutional services (Van Rosmalen et al., 2008).

However, many forms of support cannot be provided effectively and efficiently or even at all by peers. Each Learning Network qua online network needs a substrate in cyberspace to function, hence server space needs to be bought, software to be developed and maintained, and data to be stored, backed-up, etc. Furthermore, a Learning Network can only thrive if it is populated with a variety of support services that facilitate the learners’ stay in the network. Current expertise and skills need to be established and translated in terms of a network’s specific competence map, goals need to be mapped on that same map and translated in terms of trajectories of learning activities; learning activities need to be developed and updated; learners need to be monitored and assessed, formatively and upon request summatively; requests for any kind of help need to be routed to appropriate people or FAQs; etc. In the next section, these services will be discussed under the rubrics of three Programme themes. Setting up and maintaining such services require the development of adequate business models, which may be network specific, more or less extensive,

be commercially inspired or rely on community services. Admittedly, without such models Learning Networks may never become a reality, however clever their design plans from the perspective of providing support services to online, social learning may be. However, such models will not be discussed explicitly. Although pilot implementations of Learning Networks are foreseen (see below), the theoretical study of what business models may serve best what kind of network falls outside the Programme's scope.

3. Programme themes

We assumed that a Learning Network is an online network. We assumed that it may be individuated by its focus on a particular domain, for which at least one competence map can be drawn up. And we have established that it is reasonable to expect that a Learning Network will evolve into the direction of a social community (or several such communities). These assumptions have all been made in order to delineate a notion of a Learning Network that, once designed and implemented, serves the public function of supporting and facilitating non-formal education. However, the question of how a network structure can be designed and developed, if at all, that obeys these assumptions and produces the expected results in terms of learner outcomes and economic viability, still needs to be answered. The Programme seeks to answer this question by designing and developing a range of support services that sustain the individual learner in an economical way. These services are tied to the specific needs for support that non-formal, online learners experience. Each kind of services determines a Programme theme. Three different themes may be discerned: competence development, learner support services, and community building.

Professional Development

In typical formal learning settings, a learner joins a particular educational institution. This sets entrance requirements - a diploma or some kind of uniform test one has to pass, and exit requirements - a graduation test that results in a certificate or diploma upon passing. The entrance requirements effectively homogenise the learners that enter a formal programme with respect to their antecedent knowledge and skills. It also imposes learning goals that the students embrace upon enrolling, for this is the kind of degree or diploma that the institution offers. Finally, the institution provides a curriculum, consisting of courses that each are concluded with a test. Passing the test is mandatory for moving on to the next course. The curriculum traces out the road from entrance to exit, from admission to graduation. Of recent, this road is often described in terms of competences to be acquired. Nevertheless, the competence development path usually uniquely maps onto a path of courses.

Although the details may differ, this description is valid for all instances of formal learning. It is not at all valid for non-formal learning (Klarus, 2000). All learners who join a Learning Network will have objectives, more or less well articulated. These are their privately held objectives. As non-formal learners view a Learning Network as a mere means to his or her ends, they typically will need help better to articulate their goals. More importantly, their goals will also have to be translated in terms of specific competences that feature on the Learning Network's competence map in order to make sense in that context. This demands services that map someone's goals onto a competence-bound goal position unique to the Learning Network in question. A similar mapping is also needed with respect to someone's starting position. After all, there is no homogeneous cohort. Whoever joins a Learning Network will not be a clean slate, but will have past educational and labour experience. This experience needs to be translated into competences which then have to be marked as 'already acquired'. This parenthetically explains why a Learning Network needs to be characterised by at least one competence map. It makes also why more than one competence map is only admissible if these can be mapped onto each other¹⁹.

¹⁹ Interestingly the IEEE/LTSC/WG20 has recently launched a new project which should draft a specification for a standard for defining relationships among competencies.

Mapping a start and goal position into a Learning Network's competence space is hard because of the ambiguity of the descriptions of backgrounds and goals in ordinary language. It becomes even harder as learners will no doubt change course midway, making a re-evaluation of the mapping necessary. Disambiguation and identification of prior and goal competences is nevertheless imperative as the lack of it would hamper both the influx, the through-put, and outflow of new learners. After all, the competence map mediates between the learner's language and the language of the Learning Network. Without adequate and speedy mediation, the learner has no access to the resources of the Learning Network and cannot progress. In short, there should be services that delineate competence paths. The Professional Development theme researches, designs, develops and evaluates such a service.

However, the design and development of such services first has to tackle the following question, which is in part empirical, in part definitional: between any two competences, will there always exist a competence development path and, if so, maximally one? Indeed, further questions may be asked about the kind of hierarchical organisation of competences that belong to the same map. The answer to these questions depends on the structure of competence maps. To some extent, one is free to define a desirable structure. This would result in a structure that maximises the convenience of working with it (see also the next theme on Learning Network Support Services). So, for instance, a structure could specify that any two competences are connected by at most one link and not necessarily one, which specifies the 'is a prerequisite for'-relation. (It remains to be shown that this indeed is a desirable structure.) However, competence maps have been drawn for various domains and, as a matter of contingent fact, particular customs adopted in them may or may not correspond to the present definition. Such maps often follow from specific operationalisations one has adopted for competences. This could result in the factual existence of zero to several competence development paths between any two competencies. So desirable and actual structures of competence maps may differ. Stipulatively altering what is already customary is pointless and one had better develop services that take this into account. On the other hand, it remains useful to point out what would have been a better or even the best structure to adopt and point how this eases the job of the services to be developed.

Questions addressed by this theme are among others:

- What competence descriptions and maps are robust enough to support a diversity of interest groups and remain valid for almost a learner's full life span?
- How should a competence map for a specific Learning Network be drafted?
- How can learning opportunities (materials) best be mapped to a specific competence map? What constraints if any are conducive to such mappings' usefulness?
- How can prior competences be assessed adequately and in ways that are commensurate with their intended usage?
- How can learning objectives be mapped into a specific competence map, what do the tools needed for this look like if they are peer-based or provider-based?
- What tools can be developed such that peer assessments of competences can be carried out successfully?
- How can (commercial) assessment providers be involved in providing assessment services, both formatively and summatively, both of prior competences and of competences allegedly acquired in the Learning Network?
- How can such providers be given access to a specific Learning Network in order to offer their services? What privacy issues need to be taken into account and in what ways do they affect such services?
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Learning Network Support Services

In a traditional organisational view of a Learning Network, various providers will be active, who collectively offer a variety of services. A hosting provider makes sure that a particular Learning Network can have an online presence, that users once registered remain having access, that a helpdesk for technical questions is in place, that back-ups of data are made, etc. There will also be various content providers, who each provide units of learning (courses, lessons, modules, etc.) through which the learners may acquire particular competences. Providers of assessment services will be present too, offering assessments of prior competences and competences acquired. And as a final example, providers of tutoring services will help out learners with content and study-related questions. All these services literally stand ‘in service of’ the well-being of the learners, whence they are called here Learner Support Services. As indicated, this view of Learner Support Services rests on a rather traditional view of organisations: a particular service is needed and some unit is set up, top-down, and called upon to organise its availability. As was argued in the introduction, a Learning Network offers an alternative answer to the question of how learners, in particular non-formal learners and lifelong learners, can best be helped out.

To become more specific, in traditional, formal education, learners are guided from beginning to end, from admission to diploma, by the structure that the curriculum provides. Moreover, at each step in their journey through the curriculum, they are watched over by staff who teach them what they need to learn, who answer their questions, content-bound or school-related, who assess their progress, etc. Non-formal learners have the same kind of needs, but these have to be catered for differently. They also have additional needs, unknown to formal learners. The competence development service we saw maps the individual learner's start and goal position onto competences already acquired and to be acquired, respectively. How the goal competences are to be acquired, what learning activities are best suited to do so, the competence development service is silent on. In formal learning this problem does not arise, as the school takes that decision on behalf of the learner when designing the curriculum. In a Learning Network, however, the learner has to do that him or herself, picking and choosing from what learning activity providers have on offer.

More likely than not, per competence several units of learning may be available, each with specific characteristics suited to acquire that competence. And therefore one particular competence path is likely to map onto various paths of units of learning. This explains why a unique path between start and goal competence is so desirable: it simplifies things at the level of units of learning. Irrespective of whether such unity at the competence level is indeed, achievable, a language will be needed with which one may describe paths of units of learning unequivocally. However, a descriptive language is not enough. The problem of navigating the multitude of available units of learning will haunt the non-formal learner throughout his or her stay in the Learning Network. During this stay, units of learning may be added or withdrawn, and learners may change their plans, further complicating things. This problem is aggravated if various content providers are present. Now the learner also has to choose between providers, perhaps even subscribe to several providers. Units of learning will differ in several aspects - technically, in terms of level and depth of treatment, didactically, perhaps in ways the learner himself is unaware of. Units of learning may even be navigable internally, if they offer choices between alternative activities. And yet again, the learner has to choose. A service is needed that helps the learner navigate, between units of learning, within units of learning, between providers.

While studying a unit of learning, a learner may be confronted with content-bound questions he cannot resolve himself. Trivial, factual questions of the who, what, where, when - kind may be resolved by seeking recourse to a search engine, Wikipedia etc. Non-trivial questions of the how and why-kind, that demand comprehension and deep understanding rather than factual knowledge

cannot be thus resolved. In formal education, the help of a teacher or tutor is sought and usually found. This, however, may not be available or may be too costly in non-formal education. A service is needed that is able nevertheless to help the learner.

These kinds of learner Support Services support the non-formal learner during his stay in the Learning Network. In the above, we gave but two examples of such services. Other services may relate to help with scheduling and planning activities, with applying for formal accreditation of a specific learning path, with the acquisition of library services, printing of materials, forming study groups with peers, etc. Whatever learner support services eventually are needed and devised, they come in two basic flavours. Both make recommendations to individual learners based upon questions, explicitly asked or implicit to the situation they are in. First, the recommendations may be based upon an analysis of the collective, average behaviour of peers that have thus far inhabited the Learning Network. This average behaviour is based upon filtering and collating the personal histories of peer learners. These personal histories really are collections of all kinds of data, logged or self-inputted during one's stay in a Learning Network. The recommendations may be refined by taking into account certain characteristics of the learner that requires the advice. But the advice always takes the form of a statement about the collective actions of peers in situations similar to that of the advice-seeking learner. These actions, it is assumed, should benefit the advice-seeking learner too. Furthermore, the advice is given in a depersonalised form. Although it is based upon the actions of other learners, it has been abstracted away from the concrete action instances of those learners.

The second kind of recommendation does not take collective actions but personal experience as its starting point. The premiss underlying it is that peers who have been in situations similar to that of the advice-seeking learner, would themselves be in a good position to provide advice. At this point, the advice-seeking learner and his knowledgeable peers do not know each other and the service would recommend them to each other. Obviously, care should be taken to connect up the right peers. The service to be developed should guarantee this is the case, as well as ensure that several other conditions, such as the avoidance of overloading expert peers, are met. Although both the collective and personal kind of service provide recommendations and although both are based upon the actions of peer learners, they differ significantly in the way the recommendations are conveyed.

Irrespective of the kind of learner support service that is offered, they need to be designed, developed and maintained. This is the role of support service providers. Allowing these providers to do their job properly requires an opinion on the kind of architecture that is most suitable. Such architecture should be sufficiently flexible to be able to accommodate a variety of situations. Specific Learning Networks will most likely not be built from the ground on up, but will have to be grafted upon existing infrastructures. These may be rather tightly organised, existing, dedicated Virtual Learning Environments or very loosely connected, almost coincidental groupings of people who have a collective web presence. Although there are limits to what is technically feasible, the widest possible range of settings between the two extremes mentioned should be supported. Another constraint to the requested flexibility is that a minimal functionality of each individual service and the collection of services need to be maintained, lest the ambitions expressed with the present Programme flounder.

The Learning Network Support Service theme therefore researches, designs, develops and evaluates learner services. It also looks into the question of what kind of recommendation service - collective or personal - is suitable in what situation, leaving open the possibility of developing both ones. Finally, it looks into the question of what architectural set ups provide the best environment for such services.

Specifically, the following questions are addressed:

- What learner services are minimally necessary, which ones are nice to have?
- What profiling data on learners need to be stored to allow learner support services adequately to operate?
- What privacy issues are there that constrain data storage and accessibility, and how do they affect the setting up of learner support services?
- What technology is most suited to underpin which learner support services: semantic web technologies that demand explicit ontologies, statistical techniques based on language technologies, or mixtures of them?
- What software technologies are best suited for the design, development and coding of learner support services, in regards to the need to optimise between flexibility of deployment in several specific Learning Networks and seamless coexistence in one specific Learning Network?
- To what extent is an overarching, pre-defined architecture needed and to what extent can it be avoided so as to allow for maximum setting-independence of specific learning networks?
- What interaction design principles are specific to supporting lifelong learners with a variety of services?
- How should learning support services be configured to support the emergence of ad-hoc transient communities?
- What services other than learner support services (Learning Network services) are needed, for instance services to support (commercial) providers of hosting services to a Learning Network, of content, assessment services, tutoring, etc.

Professional Communities

The Professional Development and Learning Network Support Services themes argue from the perspective of the individual learner. Even if the personal recommendation services rely on contacts between learners, these contacts are not leveraged to benefit the community as a whole. Thus the benefits social interactions may bring to Learning Networks are thus far still ignored. As personal contacts are the building blocks of a social structure, the personal recommendation services are the starting points for creating such a structure. Although the contacts that these services initiate are fleeting (the last as long as it takes to arrive at mutual agreement about the advice) and highly targeted (they are prompted by the particular topic of the advice), they can be used to seed longer lasting and more substantial contacts.

Peer advice, even if it is given by peers that have been carefully selected, is more prone to error than advice given by the staff tutors and teachers in formal education. According to this argument, one should thus avoid peer advice, whether of the collective or personal kind. The situation may be likened to the individual results returned by search engine queries on the Internet. Indeed, many point out the inferiority of the Internet as a source of knowledge as compared to handbooks written by experts. However, the collective wisdom ('wisdom of the crowds') of several such queries combined, turns out to coincide with expert opinion. Cohen and Rosenzweig developed a bot that combined the results of one query (for obvious reasons, only 'trivial' questions were asked) and plotted the results in a diagram (Cohen & Rosenzweig, 2005). In the vast majority of cases the modal answer coincided with the expert opinion found in handbooks. In the one case it didn't, the bimodal distribution revealed by the bot reflected a discussion in the expert community that had not yet entered the handbooks! Thus collective wisdom helps to avoid the individual errors that, indeed, are more likely to appear in such circles as the Internet and peer groups than in expert circles. Peer advice should thus preferably be given by several peers at the same time, better still, should be the

result of a discussion between peers. The, carefully selected, peer group that provides personal advice we have dubbed an *ad-hoc transient community* (Kester et al., 2006; Sloep et al., 2007). It is ad hoc in that it is tied to the particular question that brought it into existence, it is transient in that it lasts as long as the question has not been satisfactorily answered.

These ad-hoc transient communities, we postulate, are instruments that are particularly well suited to seed the emergence of less ephemeral groupings of people with longer-lasting and more substantial contacts (Shafer & Anundsen, 1993). And such communities, the argument goes, may lead to the emergence of groups of connected learners that gradually acquire the characteristics of genuine communities of learners (Bouman et al., 2007 p.7; Wellman, 1999; Wilson & Ryder, 1998). The question asked earlier of why learners would decide to behave altruistically, that is, participate in a particular ad-hoc transient community, is still relevant. Although each individual learner's following, say, a tit-for-tat strategy in its repeated relations with other learners is sufficient for collaboration between them to emerge (Axelrod, 1984, 1997), what additional ways are there to speed up or strengthen the emergence?

This question about efficiency and effectiveness of ad-hoc transient communities in fostering community growth translates in several more specific ones. How should ad-hoc transient communities be designed, what criteria should one use to select peers if not only the provision of the best possible answer is at stake but also the maximum likelihood of seeding a long-lasting learning community within the Learning Network (Koper, 2005)? What structure of a collection of learning communities within the overall Learning Network is best? For example, is one large, uniformly connected community to be preferred over a patchwork of several internally well-connected communities with relatively weak ties between them? What organisational measures at the level of the network as a whole should be taken to guarantee its prosperity, is 'lurking' allowed, may one have different identities, may one leave and re-enter the Learning Network at will (Preece, 2000; Strijbos, 2004)? How does one evaluate 'best' or 'preferable'? In terms of learning effectiveness and efficiency alone or should longevity and the gradual change of pure communities of learning into mixed communities of learning and practice be the criterion of choice? What measures can be taken to have incipient Learning Networks evolve in these directions. There is a large literature on this topic, partly in the CSCL world (for instance Kester, Van Rosmalen, et al., 2007; Kreijns, 2004; Strijbos, 2004) and partly in the corporate world (for instance Kollock, 1998; Kollock & Smith, 1999; Wenger, McDermott & Snyder, 2002). However, these insights need to be re-evaluated and amplified if one wants to design and develop online communities for non-formal learning. These are the kinds of research questions addressed by the Professional Communities theme.

In summary, the following questions will be addressed:

- How should learner support services be configured so as to contribute maximally to the emergence of sociability in a Learning Network?
- What incentive structures, if any, are needed to fire off and maintain learner support services on the long term? Are these domain, profession or culture dependent?
- How can sociability best be defined and measured if it is to act as a proxy for the kinds of social relations that Learning Network inhabitants should maintain to further their own interests qua lifelong learners?
- What network structure, in social network analytical terms, are most conducive to the emergence and maintenance of communities (of practice and learning) within a Learning Network?
- How can desirable network structures be attained? To what extent are they bound by profession, domain, culture, dominant age, etc.?

- How, if at all, can a balance be achieved between a Learning Network that is self-organised and self-organising on the one hand and plays host to a variety of for-profit support service providers on the other hand?

4. Research methodology and key technologies

The three themes discussed all conspire to answer the question of what features a Learning Network needs in order to do its job properly. The question of how one should go about answering that question, of what methodological and technological approaches one should use, has not been answered yet. Crucially, any service of any of the three kinds discussed will need to be captured in software in order for it to be of use to the inhabitants of a Learning Network. To that end, questions need to be answered such as: How does one arrive at the specification of a service?, How does one evaluate its efficacy?, How does one fit it into the overall design of a Learning Network?

Design research

Methodologically speaking, the Programme adopts a design research method. First, through analyses of the kind carried out in the previous section a use-case description for the functionality of a particular service is made. Second, from literature studies one acquires theoretical insights in the mechanisms, and their constraining factors, that can be laid down in the business logic of the software artefacts to be developed. This results in a design specification. Third, by conducting simulation studies on mathematical models and by experimenting with mock-ups and early prototypes, modelled after the design specification, data are gathered with which the design specification can be evaluated. These studies will lead to its fine-tuning, perhaps overhauling. Note that the data these studies reveal are of two distinct kinds. The experiments return genuine empirical results, even if their validity is limited due to the initial modesty of the experimental set-up. With them the theoretical assumptions on business logic and constraining factors that went into the specification may be questioned. The simulation data, on the other hand, merely reveal the consequences, in terms of artefact behaviour, of the assumptions that went into the design specification. These data help explore the optimal parameter settings (parameter estimation), as well as the relative impact of particular design variables (sensitivity analysis). Fourth and finally, a more extensive empirical study is carried out with the service to evaluate it properly before its deployment in a Learning Network. Clearly, this four-step procedure is an idealisation, more, and more intermediate steps will be needed for a proper optimisation and evaluation of a specific service.

Technologies

Research and development work in the area of technology-enhanced learning is of a multidisciplinary nature. Similarly, the work in the themes builds on several technologies. The following overview is exhaustive nor final, the progressing of the R&D work may necessitate the adoption of new technologies and the abandonment of existing ones.

As already indicated, in order to design and build the services various software technologies are needed (for requirements analysis, for system design, including interaction design, for coding, for testing, etc.). Also a view on what the overall architecture of a Learning Network as a whole should be like, is needed since the services to be developed should fit into that architecture. The question of the precise way of implementing the services in software is beyond the scope of the present document, as is the detailed description of a suitable architecture (but see the TENCompetence project). However, from the characterisation of a Learning Network as an online social network that should facilitate non-formal learning, some lessons may be drawn. In this characterisation, the needs and the specific situation of the individual learner are paramount. Everything else, to the extent that this is empirically possible and technically feasible, should give way to this. Thus, the

push model of traditional education was revealed to be inadequate. Similarly, the monolithic virtual learning environments that are abundant in traditional, push education won't do. They demand the learner to adjust his habits and computing environment to that of the VLE offered by the school. Not only does this increase the threshold to participation for any learner, the non-formal learner may now have to cope with two (work and 'school') or even three (work, school and home) different environments. This rapidly becomes too big a stumbling block. Minimally, it detracts the learner from what should be its proper concern, use the Learning Network to fulfil his learning needs. Ideally, but particularly so in the case of non-formal learning, a personal learning environment is needed. Such an environment integrates smoothly with the computing environment the learner works with and is accustomed to. It makes few additional demands and only if their need is obvious at the outset. It goes beyond saying that the technical challenges, both in an architectural sense and in terms of the particular way of implementing a service, of providing every learner in a Learning Network with his or her own personal learning environment, are large. The tension between what is desirable and what is technically feasible may not be resolvable to everyone's satisfaction.

The services, particularly the learner support services, rely on the availability of data on the learners in the network. These data encompass logs of past interactions with the services of the network, but also knowledge contributed, be it in the form of answers to questions asked or even user-generated content (units of learning). That users will generate content, even in the form of units of learning is something to be expected in modern learning environments, but particularly those aimed non-formal learners (Fischer & Ostwald, 2002). Also some personal data are needed that pertain to a learner's life outside the Learning Network, such as calendar data, contact details, past performance data. The more the Learning Network's infrastructure succeeds in becoming a genuine personal learning environment, the tighter the integration will be between someone's personal life and his life in the Learning Network. This is both desirable, from the point of view of the success of the Learning Network, as undesirable, as it may give rise to privacy concerns. Whatever the exact extent of the available user data, they need to be stored, searched and processed in order for the services to carry out their jobs. As Learning Networks are thought to be relatively large (several hundreds of people) and live for relatively long periods of time (years rather than months), the data pile and its complexity quickly increase. This means that expertise in data-mining will be needed to extract what data are needed. It also means that language technologies are needed to make semantic sense of what has been stored, particularly the data that relate to the domain content of the Learning Network. In the latter case, an informed judgement is needed of the extent to which ontology-based, semantic web technologies are used and statistical, text-mining techniques or mixtures thereof.

The community development services aim to foster the emergence and evolution of one or several communities of learning within the Learning Network. Whatever the best structure of the Network as a whole and the communities within it may be, their structure needs to be captured and its evolution followed over time. Social network analysis provides several techniques with which this may be done (Scott, 2002). These techniques thus are needed for the Professional Communities theme.

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